INSYS
MICROELECTRONICS

Manual

INSYS GPRS 5.0 Ethernet

1 Introduction

Validity range of the manual

This user manual applies to the device INSYS GPRS 5.0 Ethernet.

Purpose

This manual is directed primarily at technical staff, in particular:

> ➢ Programmers
> ➢ Implementers

Required basics

General knowledge regarding communication technologies is required.

Safety Instructions

This manual includes notes which must be observed in order to avoid material damage. The warnings and cautions are described as follows:

> **Caution - Damage of components!**
> Not observing this note may result in destruction of the device.

> **Warning!**
> Failure to comply may result in malfunction.

> **Note**
> Notes contain important information which you should observe in particular.

Online availability

The manuals are available in German and English at http://www.insys-tec.de.

Technical support

Call technical support at:

> ➢ E-mail: insys@insys-tec.de
> ➢ +49 941/560061

Repurchasing of legacy systems

According to the new WEEE guidelines, the repurchasing and recycling of legacy systems for our clients is regulated as follows:

Please send those legacy systems to the following address, carriage prepaid:

Frankenberg-Metalle
Gärtnersleite 8
D-96450 Coburg

This regulation applies to all devices which were delivered after August 13, 2005.

2 Scope of Delivery

Before you begin with the initial operation, please check if all accessories are included in the box.

> ➢ INSYS GPRS 5.0 Ethernet
> ➢ User Guide
> ➢ Crossed ethernet cable

Please contact your supplier if the content is not complete. Please also check the device for shipping damage. Please also refer to your supplier if anything is damaged.

Please keep the packaging material for possible future shipping or storage.

Optional accessories

> ➢ GSM antenna: Outside mounted antenna, magnetic base antenna or patch antenna

3   Overview

The INSYS GPRS Ethernet is a mounting rail device for industrial applications. It has a compact design and a robust plastic housing. It offers the following characteristics:

➢ Quadband GSM engine for all four frequency ranges
   (Applicable worldwide[1])

   ▶ **Note**

   Before using the INSYS GPRS 5.0 Ethernet you should check the certification requirements in the country of deployment.

➢ GSM services: GPRS Class 12, GSM/CSD data connection

➢ 10Base-T Ethernet

➢ NAT routing function to connect local networks to the Internet via GPRS

The application can be permanently connected within the GPRS network, while the accounting takes place only for the transmitted amount of data ("pseudo leased line").

Fields of application

The INSYS GPRS 5.0 Ethernet offers several options for transmitting data via the GPRS network. It can be used to establish data connections for remote control or remote monitoring of IP-capable devices.

Configuration

You may easily configure the INSYS GPRS Ethernet via a browser GUI.

Interfaces, Display and Control Elements

➢ Slot for the SIM card of a GSM provider (3V/1.8V cards)

   Miniature SIM card reader with integrated compartment

➢ FME antenna connection

➢ Reset key

➢ 5 LEDs for status display

➢ 2 digital inputs

➢ 2 digital outputs (potential-free relay switches)

➢ Serial RS232 Interface (without function)

The connections for the power supply, the inputs, and the switch outputs are designed as terminals.

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[1] As default, the frequency ranges 850 MHz and 1900 MHz are deactivated due to FCC guidelines. To enable those ranges, please contact the INSYS Microelectronics
Sales Department (Phone ++ 49 (0)941/560061, e-mail: insys@insys-tec.de)

3.1   INSYS GPRS 5.0 Ethernet

3.2   Function Overview

The INSYS GPRS 5.0 Ethernet offers the following functions:

- ➢ IP based routing between Ethernet and GPRS network
- ➢ Network Address Translation (NAT) for outgoing connections of devices in the local network
- ➢ Port forwarding for incoming connections to devices in the local network
- ➢ Automatic GPRS connection setup after a restart
- ➢ The GPRS connection setup is also possible via the input IN1
- ➢ The Ethernet interface can be switched off via input IN2, which enables the operation of several devices in redundancy
- ➢ Password protection for the browser configuration
- ➢ Storage of the SIM card PIN enables automatic login into the GSM network after reset/restart
- ➢ Timer-controlled logout and login into the GSM network to prevent undefined login states in the GSM network
- ➢ Quadband GSM/GPRS module 850 / 900 / 1800 / 1900 MHz[2]
- ➢ Firmware update of the device (local)
- ➢ Integrated SIM reader and external SIM interface for 3V / 1.8 V SIM cards
- ➢ Hardware watchdog
- ➢ Field strength indication of the GSM network. Status indication of the INSYS GPRS 5.0 Ethernet

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[2] As default, the frequency ranges 850 MHz and 1900 MHz are deactivated due to FCC guidelines. To enable those ranges, please contact the INSYS Microelectronics
Sales Department (Phone ++ 49 (0)941/560061, e-mail: insys@insys-tec.de)

3.3   Application Example
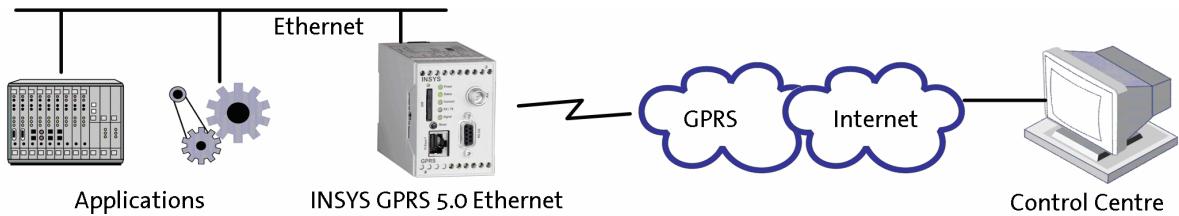
3.4   Technical Data

3.4.1 General

GPRS Data transmission	GPRS Multislot class 12 Coding scheme 1 to 4
Mobile Station	Class B
Support	PBCCH
I/O	2 digital inputs (Pull-up), 2 digital outputs
Temperature range	32 °F - 131 °F
Output power	EGSM 850 and 900: Class 4 (2 W) GSM 1800 and 1900: Class 1 (1 W)
GSM frequencies	850 / 900 / 1800 / 1900 MHz [3]

3.4.2 Mechanical characteristics

	INSYS GPRS 5.0 Ethernet
Weight	250 g
Dimensions in mm (w x l x h)	55 x 110 x 75
Protection class cover front	IP 40
Protection class terminals	IP 20

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[3] As default, the frequency ranges 850 MHz and 1900 MHz are deactivated due to FCC guidelines. To enable those ranges, please contact the INSYS Microelectronics
Sales Department (Phone ++ 49 (0)941/560061, e-mail: insys@insys-tec.de)

3.4.3 Power Supply

The INSYS GPRS Ethernet requires a power supply of 10 to 60 V (DC) at a maximum of 5% ripple.

> **!** **Caution - No overvoltage protection!**
> The INSYS GPRS Ethernet does not have a fuse.
> Surges and excessive voltages may result in the destruction of the device.

The following table shows the values that were determined for a signal field strength of 26 and an ambient temperature of 77°F (25°C). The current consumption and therefore the power consumption may increase during poor network conditions. The threshold value tolerances are subject to the typical fluctuations. A maximum of one value may be operated in the threshold value range.

These are average values for estimating the current consumption. The current consumption during data transmissions may also increase if the antenna is not adjusted correctly. This can occur for the following cases:

➢ The antenna and/or the antenna cable are not adjusted to 50 Ω impedance.
➢ The antenna that is being used is misaligned due to the situation at the installation site (metal parts, …).

	State: Standby	State: CSD Data transmission	State: GPRS Data transmission
Current consumption type at 10 V (DC)	140 mA	195 mA	290 mA
Current consumption type at 24 V (DC)	60 mA	84 mA	121 mA
Current consumption type at 36 V (DC)	42 mA	60 mA	60 mA
Power consumption approx.	1.4 W	2 W	2.9 W

3.4.4 SIM Card

For the data connection to the GSM network, the INSYS GPRS Ethernet requires a GPRS-capable SIM card from a GSM provider. The SIM card is the identification for the network provider.

The slot for the SIM card is on the front of the INSYS GPRS Ethernet.

▶ **Notes:**
   3V and 1.8V cards may be used.
   Changing the SIM card is only permitted when the device is switched off.

3.4.5 Antenna Interface

The antenna connector at the front of the INSYS GPRS 5.0 Ethernet has the type FME (male plug).

All commercial GSM antennas with a female FME connector can be used as antennas.

Ensure that the frequency band corresponds with the one of the provider when using single band antennas (900 MHz or 1800 MHz).

3.4.6 Digital Inputs and Outputs

Input
The inputs are designed as pull-up and are on HIGH in inactive, open state. The digital inputs are activated by connecting to ground.

LOW	Active	0 to 1 V
HIGH	Inactive	4 to 12 V

The input current from LOW to internal +5 V is typically 0.5 mA.

Switch output
The switch outputs are potential-free relay switches.

Maximum switch voltage:	30 V (DC)	42 V (AC)
Maximum current load:	1 A (DC)	0.5 A (AC)

3.4.7 Terminal Layout

Top
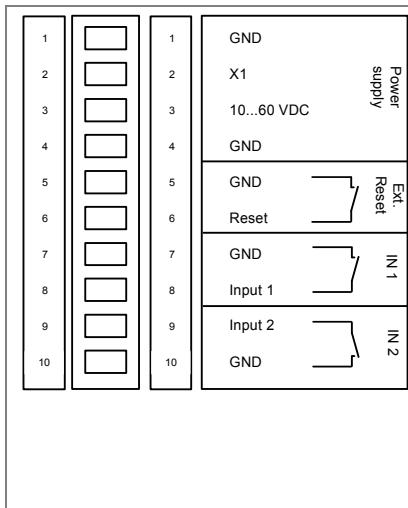
	Terminal	Meaning
1	GND	Ground
2	X1	Reserved
3	10..60V DC	Power supply 10V - 60V DC
4	GND	Ground
5	GND	Ground
6	Reset	Reset input
7	GND	Ground
8	Input 1	Input 1
9	Input 2	Input 2
10	GND	Ground

Bottom
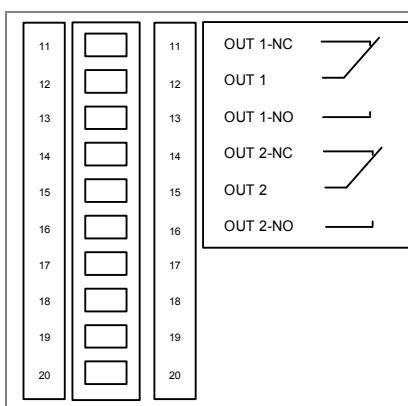
	Terminal	Meaning
11	OUT1-NC	Output 1 normally closed
12	OUT1	Output 1
13	OUT1-NO	Output 1 normally open
14	OUT2-NC	Output 2 normally closed
15	OUT2	Output 2
16	OUT2-NO	Output 2 normally open

3.5   Environmental Conditions

The following environmental conditions must be observed for the INSYS GPRS Ethernet.

!   **Caution - Wet environment!**
The INSYS GPRS 5.0 Ethernet may not be used in wet environments.

	INSYS GPRS Ethernet
Humidity	0 - 95% non-condensing
Temperature range	0°C to 55°C

3.6   Certifications

The INSYS GPRS Ethernet bears the CE symbol of conformity. This symbol is a declaration that on account of its design and implementation, this device is in compliance with the currently valid versions of the following EC directives:

Directives:	89/336/EEC (EMC directive) 73/23/EEC (Low voltage directive) 91/263/EEC (Directive for telecommunication devices)
Standards:	DIN EN 55022: 1998-04 class B DIN EN 61000-6-2 DIN EN 61000-3-2 DIN EN 61000-3-3 EN 301 489-1:V.1.4.1 EN 301 489-7:V.1.2.1 EN 301 511: V.9.0.2 DIN EN 60950-1
Approvals:	CE

3.7 Display and Control Elements

The INSYS GPRS 5.0 Ethernet has 5 LEDs for status displays and one reset key.
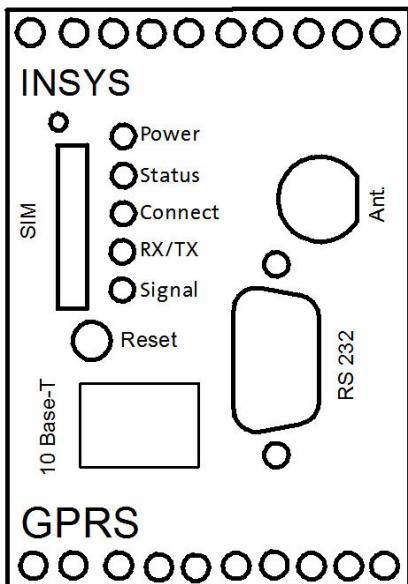
3.7.1 Display Elements

Name	Color	LED off	LED on	LED blinks	LED flashes
Power	Green	No power supply	Power supply available		
Status	Yellow	GSM engine not logged into network	PPP connection to the Internet established	Initialization phase	Slow flashing (100 ms on, 1900 ms off): Device logged into the GSM network
Connect	Yellow	No connection to the local network	Connection to the local network is available		
RX/TX	Green	No data exchange on the LAN-side	Activity on the LAN-side		
Signal	Green	GSM signal (field strength) too low	Best GSM signal (field strength)	Blinking interval depends on the GSM signal (field strength: the higher the value, the better): always ON 25 .. 31 / 60 ms 23 .. 24 / 140 ms 21 .. 22 / 260 ms 19 .. 20 / 380 ms 17 .. 18 / 500 ms 15 .. 16 / 1000 ms 13 .. 14 / Always OFF 0 .. 12, 99	

3.7.2 Reset key

Use the reset key to re-initialize the INSYS GPRS Ethernet or to load the factory settings.

Press the reset key for at least 1 second. After a 10 s pause, a simple reset (re-initialization) of the device is performed. Pressing the reset key equals the bridging of the terminals Reset and GND.

Resetting the device to factory settings is also performed via the reset key or the reset terminal. This function is described in detail in Chapter 5.1.

3.8   History

Version	Additional functions
1.01	Firmware redesign
1.02	Default IP-Address changed to 192.168.1.1

4 Installation

4.1 Initial Operation

Warning - General!
Please observe the safety instructions when putting the device into operation.

1. **Have the SIM card and PIN number ready, but do not insert the card yet.**

2. **Connecting the power supply**

   a) Connecting the ground connection

   b) Connecting the power supply 10...60V DC

   Caution - Damage of components!

   The minimum value is 10V DC.
   The maximum value is 60V DC.

3. **Connect the antenna and switch the power supply on.**
   Connect the antenna to the antenna connection using the FME plug and switch the power supply on. The power LED will light up.

4. **Wait until the device has powered up.**
   ➢ The status LED blinks during this process.
   ➢ The signal LED blinks or lights up permanently when the process is completed.

5. **Connection to the PC**
   Connect the 10BaseT socket at the INSYS GPRS 5.0 Ethernet to the network connection of your PC. For the configuration, you will need a crossover network cable.
   The LED connect will light up as soon as the network cable has been connected correctly.

PC settings for the initial configuration. Example Windows XP

6.   Open Control Panel, open Network and Internet Connections
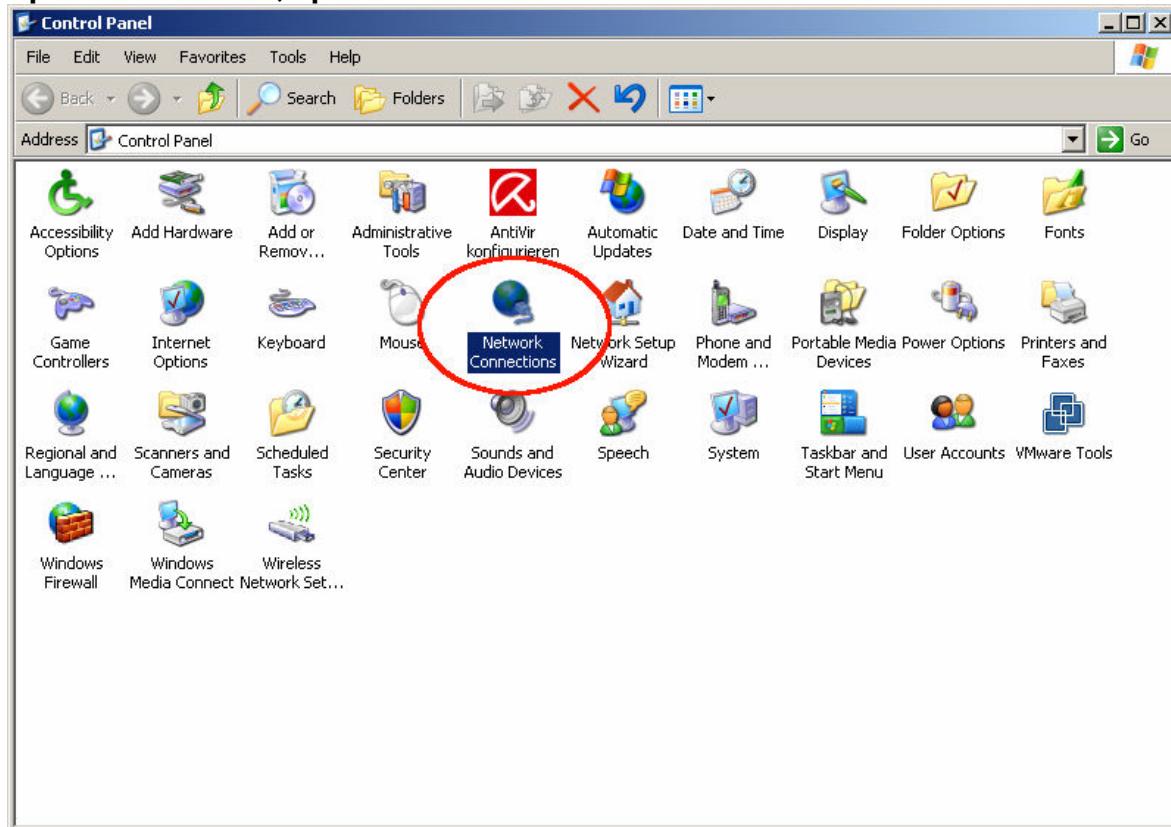
7.   Open the according LAN connection
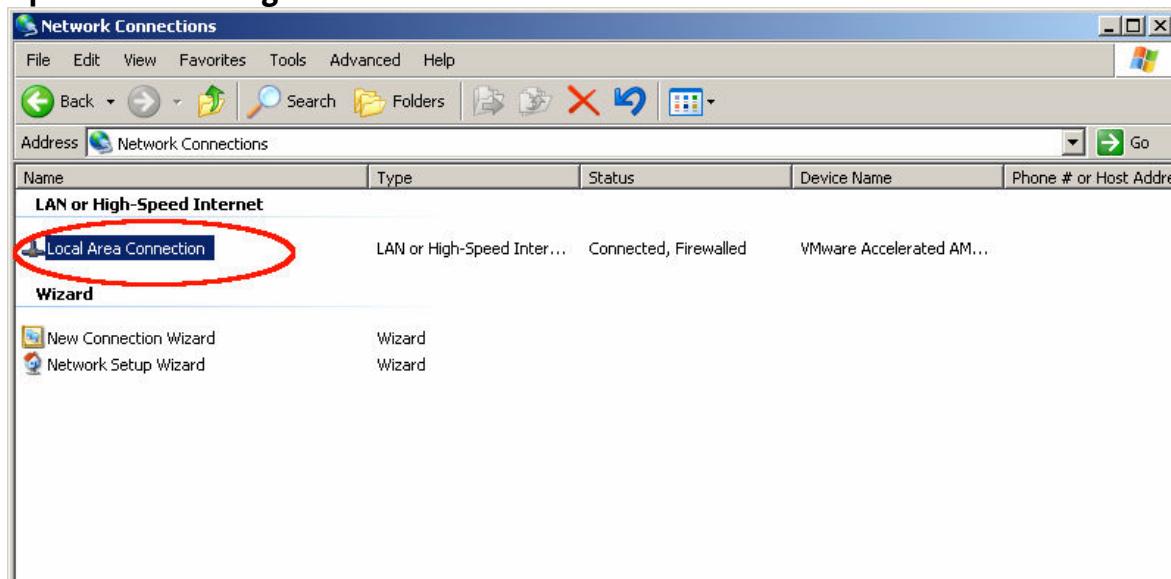
8.   Click on Properties
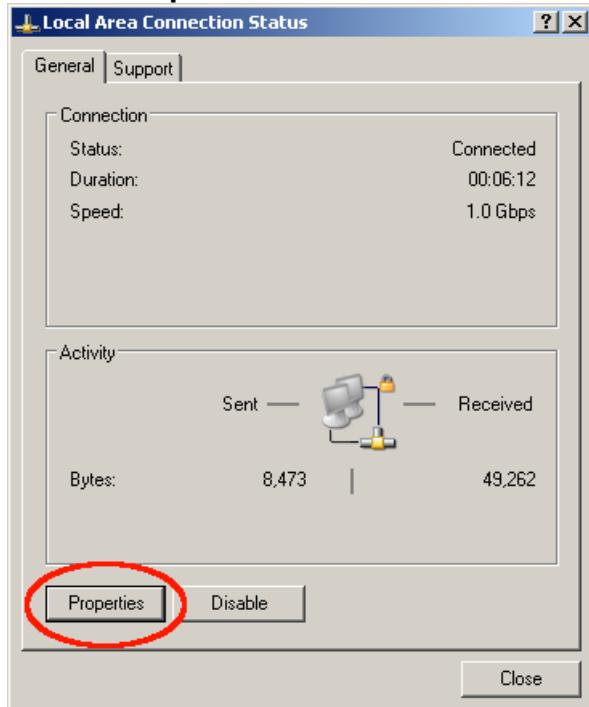
9.   Select Internet Protocol (TCP/IP) and click on Properties
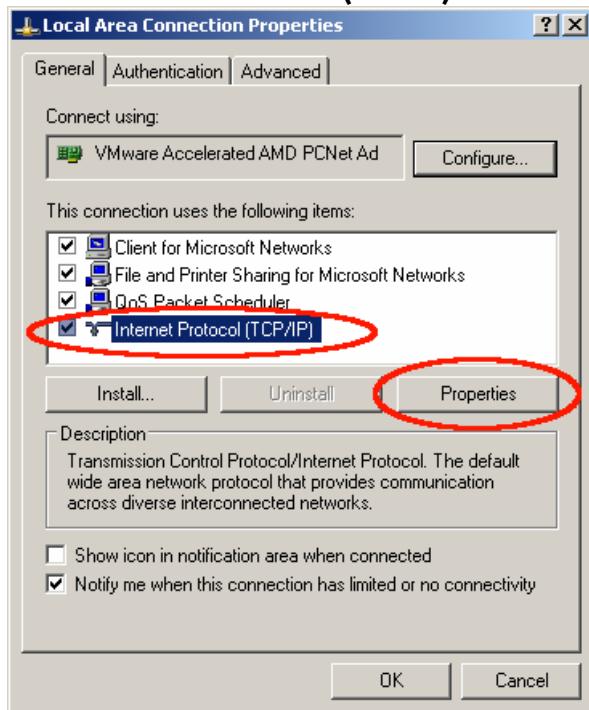
10.   Enter the IP settings

▶   **Note**
Before you change the settings, annotate the old settings to be able to restore the configuration of your computer after the successful configuration of the device.
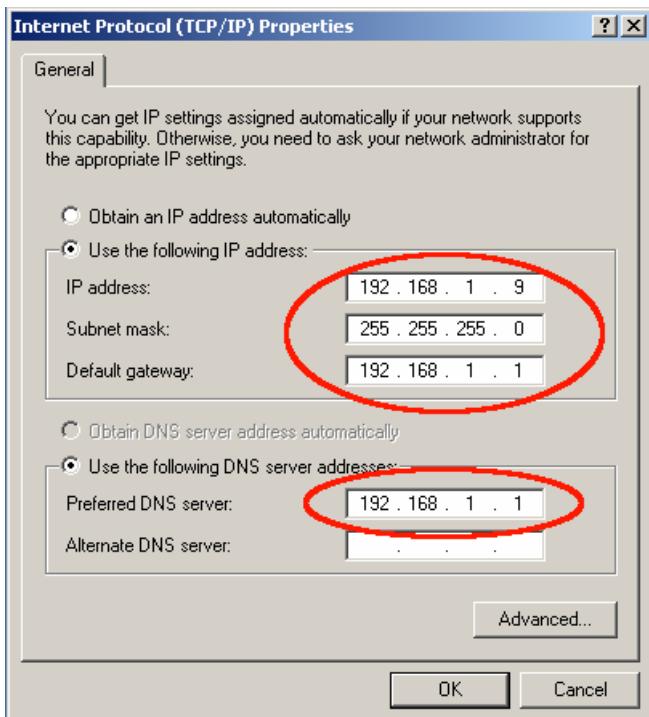
Note:

The manufacturer has set the default IP address 192.168.1.**1** (Sub network mask: 255.255.255.0) for the INSYS GPRS 5.0 Ethernet.
To be able to address the INSYS GPRS 5.0, the PC must receive an IP address from the same sub network, e.g. 192.168.1.**9.**

For the PC to enable an Internet connection via the INSYS GPRS 5.0 Ethernet, the IP setting for the standard gateway must be the address of the INSYS GPRS 5.0 Ethernet.

Default settings for the INSYS GPRS 5.0 Ethernet:

➢   **IP: 192.168.1.1**

➢   **Sub network mask: 255.255.255.0**

The INSYS GPRS 5.0 Ethernet may also serve as a DNS server. If the IP address of the INSYS GPRS 5.0 Ethernet is entered as DNS Server, the LAN applications can also establish Internet connections by entering the domain name (e.g. `www.insys-tec.de)`.

11.   Open Tools > Internet Options in the browser (in this example, the browser Internet Explorer is used)

12.   Select the tab "Connections" and click on "Settings..."
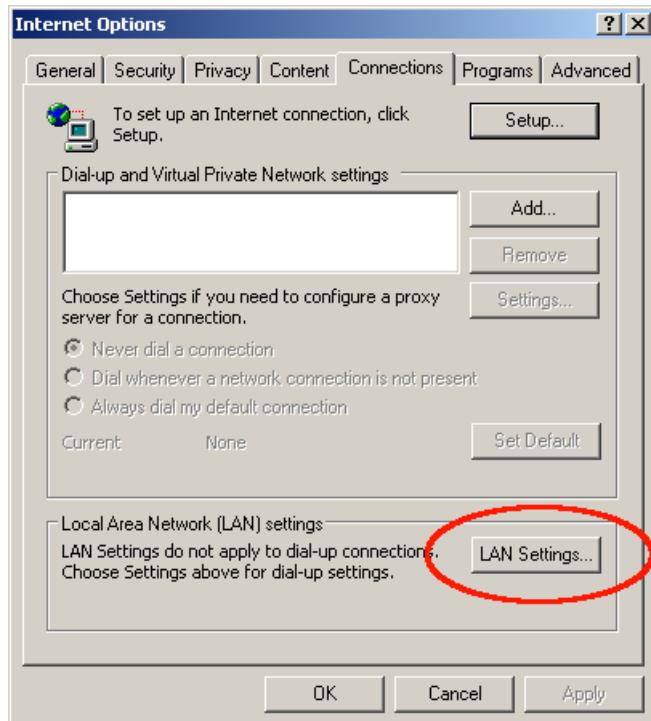
13.   Deactivate all settings
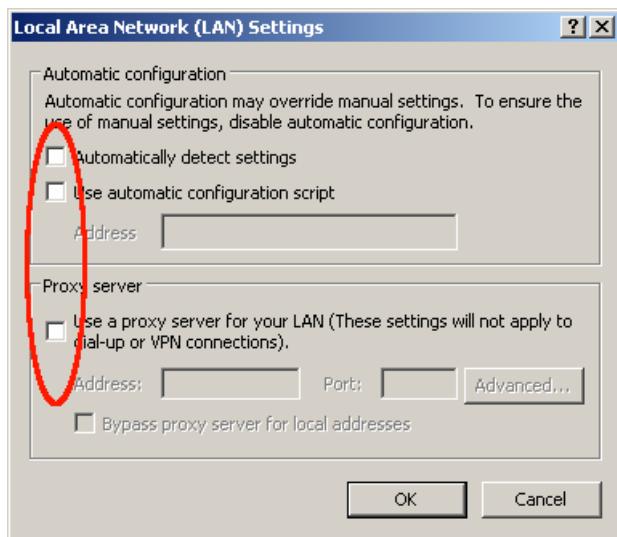
14.   Start the browser, enter the IP address of the GPRS 5.0 Ethernet

15.   A dialogue appears. Click on OK. No password and username is required at the first login.
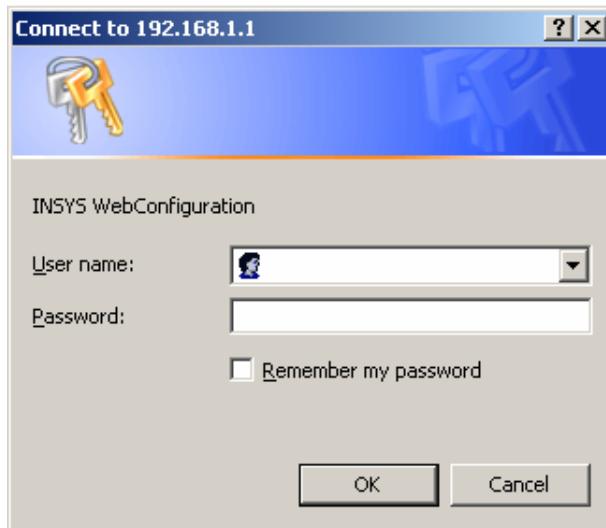
▶   **Note**

No user name or password is required for the initial configuration. During the initial configuration, a user name and a password should be assigned.

The configuration of the INSYS GPRS 5.0 Ethernet takes place via the Web interface. (See Chapter 5.5.1 Operation). When the IP address is changed, the item 7 of these instructions may need to be repeated.

16. GSM/GPRS configuration

Enter the PIN number of the used SIM card in the entry field "PIN" and enter the Access Point Name of your GPRS provider in the entry field "APN". Click on "Accept".

The other parameters are not required for an initial test and will be described in detail in the Chapter "Web interface".
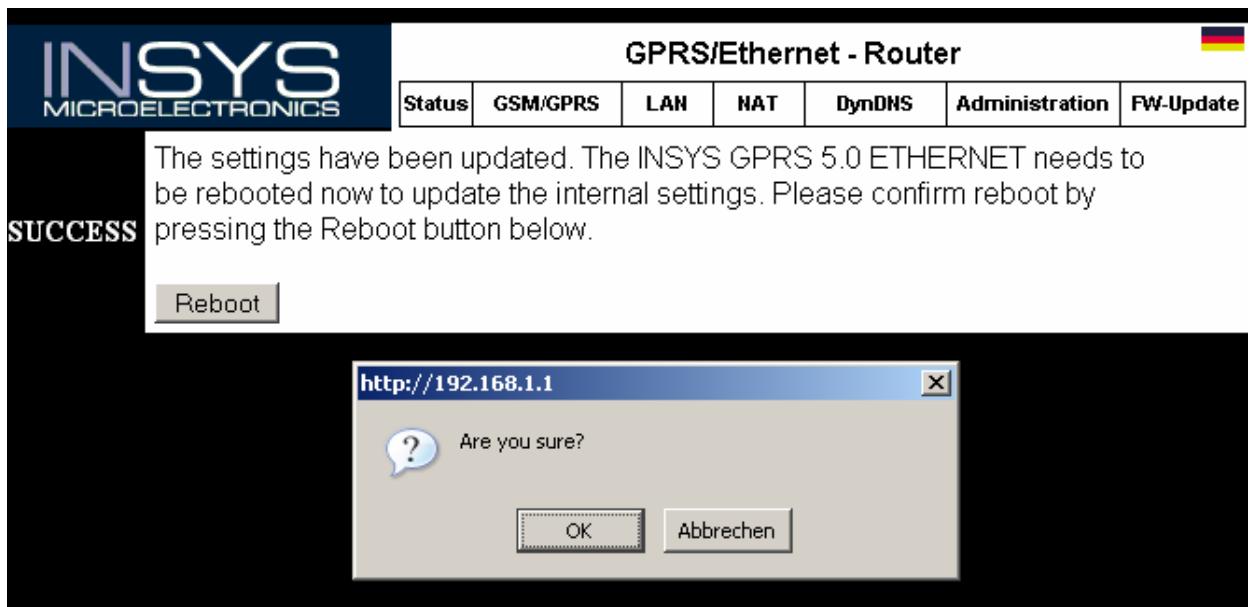
On the following page, click on "Restart" and confirm with "OK" when queried.

17.   Switch the power supply off

18.   Insert the SIM card

Press the sunken yellow button (see image) above the SIM card slot and remove the card holder. Put the SIM card into the card holder and reinsert it. The contacts of the SIM card face to the left when inserting the card.
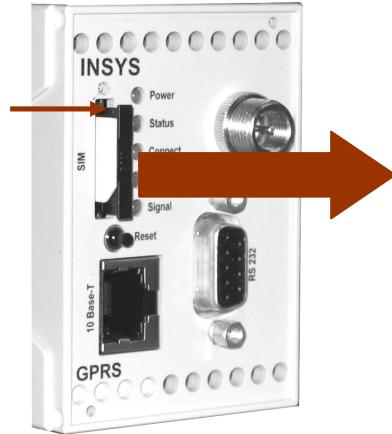
19.   Switch the power supply on
Wait until the device has been powered up and is logged in and until a GPRS connection has been established (LED Status lights up permanently).

4.2   Function Test

As soon as the LED status lights up permanently, the INSYS GPRS 5.0 Ethernet is ready for routing.

For a quick test, enter an Internet address in your web browser, such as:
`http://www.insys-tec.de`

5   Functions

5.1   Reset to Factory Defaults

There are two options to reset the device to the factory default settings:

➢ Pres the "Reset" key at least 5 times for a duration of 100 ms to 500ms each within 10 seconds.

➢ Connect the "Reset" terminal to GND at least 5 times for a duration of 100 ms to 500ms each within 10 seconds.

After 10 seconds, the INSYS GPRS 5.0 Ethernet will reset all parameters to the factory defaults.

> ▶   **Note**
> The PIN stored in the SIM card is not reset and will be maintained also after the device has been reset to the factory defaults.

5.2   Configuration in the IP Network

Devices in IP networks – private networks or Internet networks – use 3 details to identify the own device, the own network segment, and the gateway for connections to other sub networks.

All IP addresses consist of a sequence of 4 numbers in a range of values from 0 to 255, e.g. 192.168.1.1. For private networks without direct Internet connection, numbering areas such as 192.168.*.* are reserved. Please find more information in Chapter 5.3.2 Private and public IP addresses. The IP address describes the network segment as well as the number of the individual device within this segment.

IP address: Default address of the INSYS GPRS 5.0 Ethernet
                           e.g. 192.168.1.1

Sub network mask: Part of the address which describes the network segment:
                           The sub network mask 255.255.255.0, for example, describes
                           the first three values 192.168.1 of the address
                           192.168.1.1 as network segment.

Standard gateway: If a device has no direct connection to the required
                           destination network segment, it will transmit all data packets
                           for further forwarding to the standard gateway. The address
                           of the standard gateway must be in the same network
                           segment as the IP address!

5.3   Introduction to the Routing of IP Networks

5.3.1   Routing general (without NAT)

A router is the link between two network segments. It forwards the IP packets, which are not located in the network of the sender, to the other network segment.

In the computers of the network segment, the IP address of the according router to the respective destination network must be entered in the local routing table as gateway. Strictly speaking, the IP address of the router, which is also located in the same network segment, must be entered in the gateway. (See figure). Several remote destination networks may be available, where each of them is connected to the local network via a router. For each destination network, the respective available router is entered as gateway in the local routing table.

Network section
A

Network section
B

```
ROUTER
```

192.168.0.102
255.255.255.0
GW:192.168.0.1

192.168.0.1
255.255.255.0

10.0.0.1
255.0.0.0

10.0.0.101
255.0.0.0
GW:10.0.0.1

10.0.0.102
255.0.0.0
GW:10.0.0.1

192.168.0.101
255.255.255.0
GW:192.168.0.1
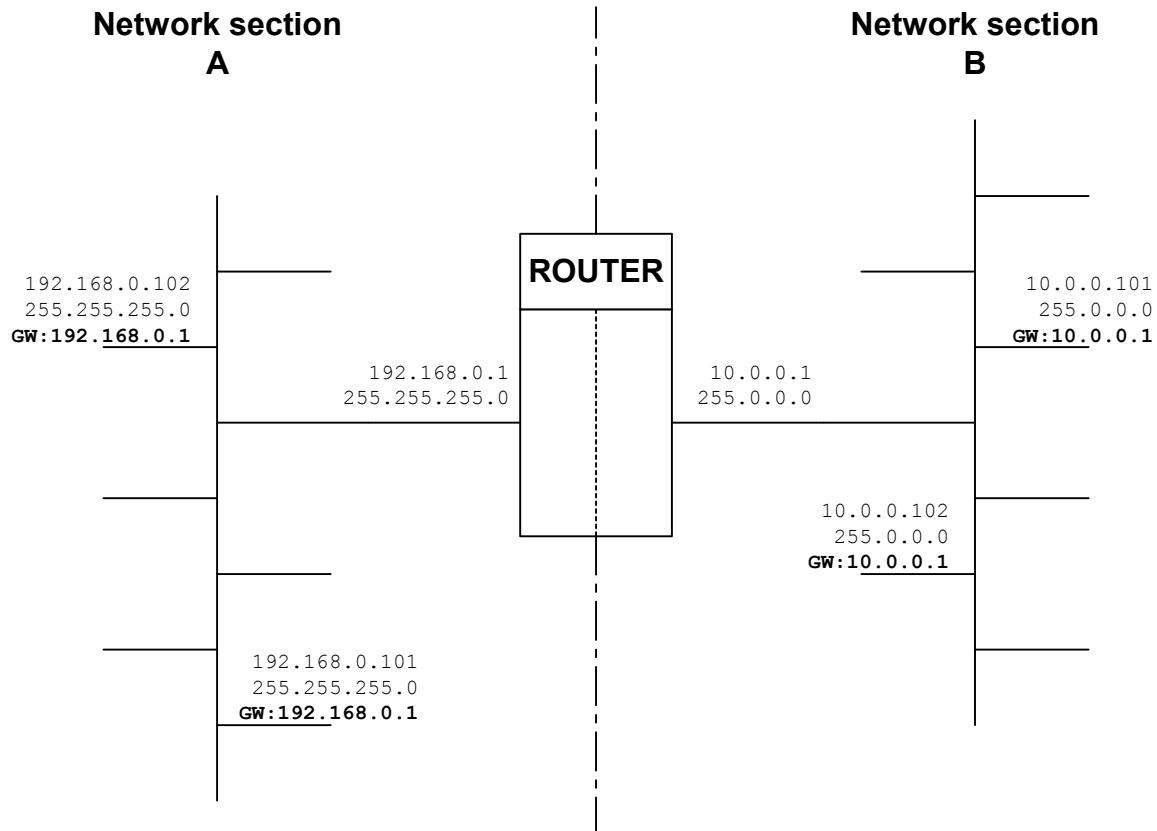
If only one router is available, this router is defined one time as standard gateway. It will then receive all IP packets which are not meant for the own network segment. It will assume the correct forwarding to the according destination network.
This forwarding is done without any changes at the IP packets. The recipient will thus know the sender and will also know exactly, where the IP packet is from.

It can be said that the source and destination are "communicating" with each other directly. Each computer in the network segment can establish a direct connection with any other computer in the network. This is possible, because each IP address is only present once in the entire network. Source and destination are therefore uniquely defined.

5.3.2   Private and public IP addresses

For each network segment which consists of public IP addresses, routing tables exist in the Internet by means of which a connection between two IP addresses from different segments may be established.

In the entire possible IP address range there are private IP addresses, which are not routed in the Internet.

Private IP addresses were defined to be able to provide many, small, non-public networks with IP addresses, which would usually not require a direct connection to each other. The same address ranges can thus be used for several networks, which drastically reduces the use of IP addresses which are available in the limited possible address space.

Private IP addresses may be taken from the following ranges.

```
➢  10.0.0.0/8          ( 10.  0.0.1   -  10.255.255.254)
➢  169.254.0.0/16      (169.254.0.1   - 169.254.255.254)
➢  172.16.0.0/12       (172. 16.0.1   - 172. 31.255.254)
➢  192.168.0.0/16      (192.168.0.1   - 192.168.255.254)
```

5.3.3 Routing between private and public networks via NAT (Network Address Translation)
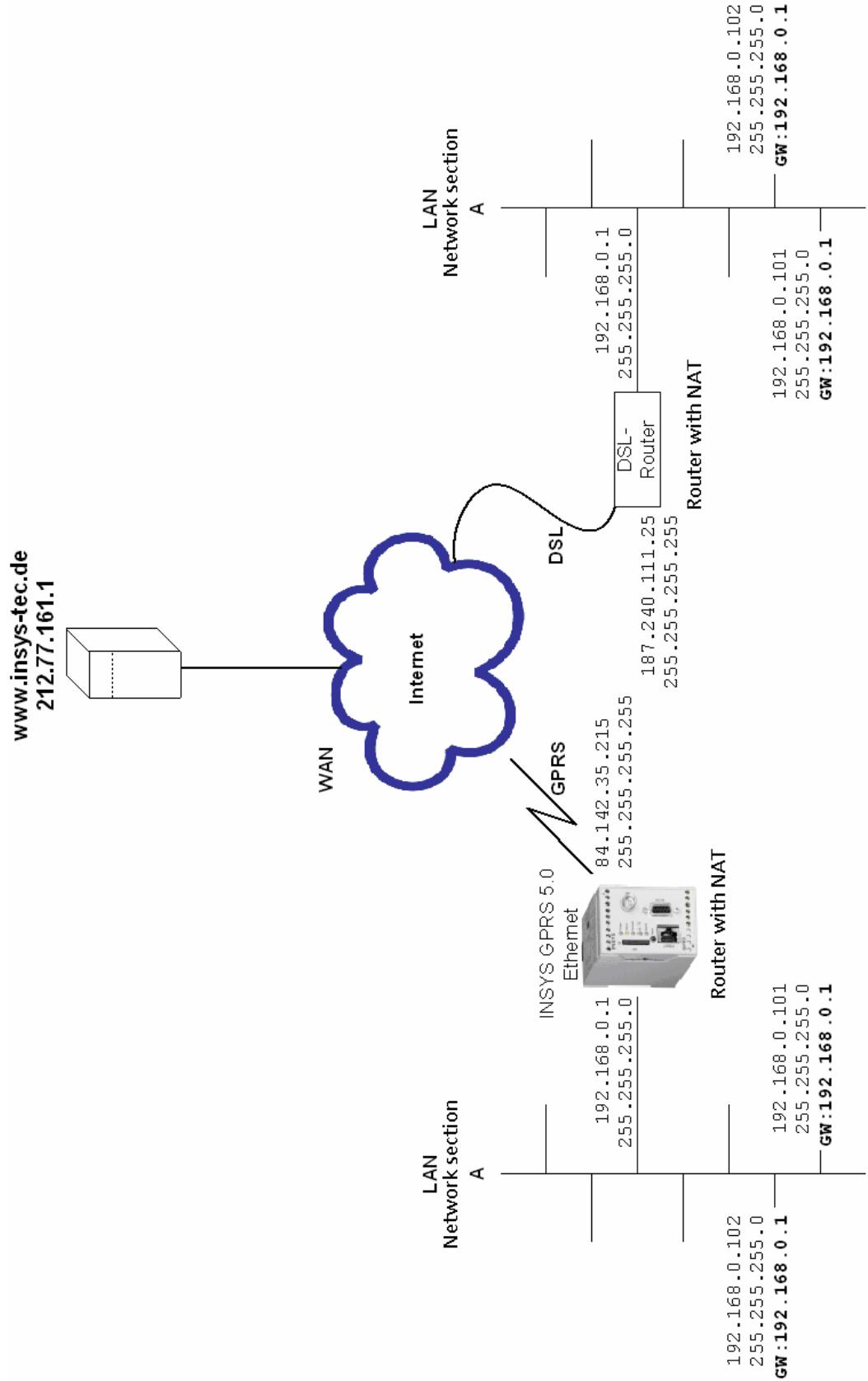
The figure shows two private network segments, which do not know about each other, but both need access to the web server www.insys-tec.de.

Both private network segments use the same IP addresses, which is possible for private IP addresses as they are not routed in the public Internet. As non of the LAN devices from the private network segments are visible in the public Internet (due to their non-routable IP addresses), they will need a proxy.

This proxy has two IP interfaces. One interface is used for the local LAN (Local Area Network) and the other one is used for the public WAN (Wide Area Network).

On the WAN-side, the proxy will receive a publicly accessible IP address. On its LAN-side, it will receive an IP address from the private address range of the according network segment.

The INSYS GPRS 5.0 Ethernet represents such a proxy. LAN devices treat it as a router or gateway, i.e. the LAN IP address of the INSYS GPRS 5.0 Ethernet is entered as gateway for LAN devices (see 5.3.1 Routing general).

If the INSYS GPRS 5.0 Ethernet receives an IP packet with a destination in the public Internet, it will - in its function as a proxy - replace the sender IP address by its public IP address.

At the same time, the INSYS GPRS 5.0 Ethernet will enter

> ➢ Its own public port number for this connection
> ➢ The IP address of the local sender computer
> ➢ The port number of the local sender computer
> ➢ The used protocol (TCP/UDP)

into a table. This table is called NAT table (Network Address Translation Table) and is the central module of the INSYS GPRS 5.0 Ethernet.'

Using the public port number that was entered in the table, it will then send the IP packet to the destination computer in the public network and will then wait for the responses of the destination computer at the same port.

For the destination computer, it now seems as if the IP packet was sent by the INSYS GPRS 5.0 Ethernet, so the destination computer will send the according response IP packets to exactly this device.

The INSYS GPRS 5.0 Ethernet will now receive its IP packet at this public port and will forward it to the local computer, which has been entered in the NAT table as local computer with its local port number for this public port.

All entries in the NAT table are dynamic entries, e.g. they are deleted, if one of the following conditions occurs:

> ➢ The sender or the destination computer close the connection by sending an RST packet
> ➢ The timeout of the selected protocol (TCP/UDP) has expired, e.g. there was no data traffic for a certain period of time

The TCP timeout can be defined for the INSYS GPRS 5.0 (see Chapter 5.5.5) The UDP timeout is 120 seconds.

The NAT table is limited to 1024 simultaneous, possible entries.

▶ **Note**
The dynamic entry in the NAT table takes place when establishing a connection from the private LAN to the public WAN.

For incoming connections from the WAN and their forwarding to services in the private LAN, static entries are used. (see Chapter 5.5.5)

5.4   Port Forwarding

5.4.1   Incoming connections

Besides the previously described, dynamic NAT entries for outgoing connections, fixed, user-defined, i.e. purely static NAT entries may be defined for incoming connections for the INSYS GPRS 5.0 Ethernet. This will remain permanently after the initialization. The maximum possible number of dynamic entries will be reduced by the number of fixed, static entries.

▶ **Note**

In the INSYS GPRS 5.0 Ethernet, a maximum of 20 static NAT entries may be defined.

It is thus possible to forward connections which come in at a certain public port (WAN port) of the INSYS GPRS 5.0 Ethernet to a computer of the local network (LAN).

Example:

A web server (TCP, port 80) with the local IP address 192.168.0.10 should be reached from the Internet.
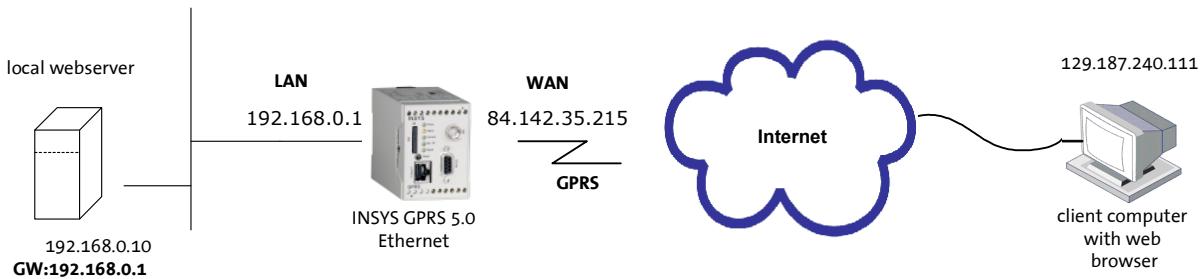
The following static NAT entry (see Chapter 5.5.5) is entered in the INSYS GPRS 5.0 Ethernet:

- ➢ WAN port: 80
- ➢ Local IP address: 192.168.0.10
- ➢ LAN port: 80
- ➢ Protocol: TCP

▶ **Note**

If port 80 on the device is forwarded to a web server in the local network, it is no longer possible to reach the web configuration interface on the device from the WAN.

After the entries were stored and the INSYS GPRS 5.0 Ethernet was restarted, the local web server is available via the public IP address of the INSYS GPRS 5.0 Ethernet (in the example: 84.142.35.215). For the client computer with web browser it seems as if the INSYS GPRS 5.0 Ethernet is the called up web server.

Any local server application, which supports the TCP or UDP protocol, can therefore be addressed from the public network.

▶ **Note**

Each WAN port can only be used once for the TCP as well as for the UDP protocol. It is possible to use a certain WAN port for TCP as well as for UDP, but it is not possible to use the same WAN port with the same protocol for several entries.

5.4.2 Operation with GPRS

To enable port forwarding, which means incoming connections with the INSYS GPRS 5.0 Ethernet, the following is required:

➢ The network provider must enable incoming connections
➢ The WAN IP address of the INSYS GPRS 5.0 Ethernet is recognized

In many GPRS networks, incoming connections are not permitted by default to protect the GPRS terminal from unwanted data traffic (load and cost). In some countries public APNs without any protection are offered, too. Using these APNs can lead to incalculable costs during the device's operation.

As an alternative, GPRS providers offer VPN services which permit incoming connections from predefined IP addresses. Fixed IP addresses are possible within the framework of VPN or special arrangements.

Especially suited are additional services like "fixed.IP" from mdex (http://www.mdex.eu), which sum up different SIM cards to a closed private network with a private IP address range. Connections from a companies' network to the devices are then set up via a VPN tunnel

Usually, the GPRS provider allocates the GPRS device a new dynamic IP address for each dial-in and every 24 hours, which the GPRS device may need to communicate to potential callers. Furthermore, the INSYS GPRS 5.0 Ethernet may be allocated a fixed hostname (e.g. gprsrouter.dyndns.org) via the DynDNS service. The INSYS GPRS 5.0 Ethernet will transfer its currently allocated WAN IP address to the DynDNS service during each dial-in into the GPRS network. The DynDNS service will assign this IP address to the according hostname (FQDN - "Full Qualified Domain Name. After each GPRS dial-in, the INSYS GPRS 5.0 Ethernet will thus be available via its hostname, provided that the network provider supports incoming connections. Please find more information regarding this topic in the DynDNS configuration in the Chapter DynDNS Configuration.

5.5   Configuration

5.5.1   Operation

The configuration pages allow simple and convenient configuration of the INSYS GPRS 5.0 Ethernet using a web browser (e.g. Internet Explorer, Opera, and Firefox), regardless of the used operating system. For the configuration, no drivers, software, etc. are required. JavaScript must be enabled in the browser.

The web interface is protected by a password. In the factory configuration, the fields user name and password are empty, i.e. the pages can be accessed without entering a password.

> ▶ **Note**
>
> A lost password can only be removed by completely resetting the factory configuration.

The settings in the individual configuration windows will only be saved when the button "Apply" is clicked. To activate the settings, the INSYS GPRS 5.0 Ethernet must be reset. This is also offered on the configuration pages.

After the settings have been transmitted to the INSYS GPRS 5.0 Ethernet, the configuration pages must be reloaded (web browser menu "Update").

The web interface is available in German and English. Switch between languages using the symbols for German ▬ or English ▓ - in the top right corner.

> ▶ **Note**
>
> If the IP address was changd by mistake and/or is unknown, the INSYS GPRS 5.0 Ethernet may also be reset to the factory settings without using the web interface (see Chapter 0 Reset to default settings).

> ▶ **Note**
>
> If your mobile network provider allows incoming connections, the device web configuration panel is reachable from outside networks by default. This may be a threat to your network security
>
> To make the web configuration panel unreachable from the outside, you can map incoming connections to port 80 to an non existent local ip-address via a static NAT entry.(see Chap. 5.5.5)

5.5.2 Status page

The status page displays the current state of the INSYS GPRS 5.0 Ethernet. In detail, the following information is provided:

IMEI:	Unique, 15-digit ID of the GSM engine
Network provider:	Name of the network provider where the device is currently logged in at[4]
Signal strength:	Current strength of the GSM radio signal (see Chapter 3.7 Display and Control Elements)
Bit error rate:	Current bit error rate
Network status:	0 – Not registered, no network search
	1 – Registered at the standard network provider
	2 – Not registered, searching for GSM network
	3 – Registration rejected by provider
	5 – Registration via roaming partner
WAN IP address:	IP address, which the INSYS GPRS 5.0 Ethernet was allocated on its public side from the PPP server.
First DNS server:	First DNS server that was provided by the GPRS provider
Second DNS server:	Second DNS server that was provided by the GPRS provider
LAN IP address:	Currently configured IP address of the INSYS GPRS 5.0 Ethernet on the local side
LAN Sub network mask:	Currently configured sub network mask of the INSYS GPRS 5.0 Ethernet on the local side
LAN MAC address:	MAC address of the INSYS GPRS 5.0 Ethernet
Firmware version:	Firmware version number
Input 1/Input2:	These fields show the status of the two inputs (low or high). Function: make the according interface accessible (see Chapters 5.5.3 und 5.5.4)
DynDNS status:	Displays the status of the DynDNS registration of the current WAN IP address. (See Chapter 5.5.6)

---

[4] The T-Mobile name is not always correctly transmitted. Instead, only CC 262 NC 01 for country no. 262 and network no. 01 are displayed.

5.5.3 GSM/GPRS

The parameters for GSM/GPRS can be set on this page.

WAN connection: Determination of the GPRS connection control:

> **Always on (default)**
> After each restart, the INSYS GPRS 5.0 Ethernet will auto-
> matically establish a GPRS connection. This will remain per-
> manently and will be re-established after an interruption.

> **Controlled via input IN1**
> As soon as the input IN1 is active (terminal "IN1" connected
> to "GND"), the INSYS GPRS 5.0 Ethernet will establish a GPRS
> connection. After the connection has been established, the
> output OUT1 will switch to normally open contact. The GPRS
> connection will remain as long as IN1 is active.
> When the input IN1 is deactivated (terminal "IN1" open), the
> existing GPRS connection is closed. The output OUT1 will
> switch back to normally closed contact.

Network provider   If the INSYS GPRS 5.0 Ethernet is not supposed to register at
identification number: the standard network provider, but a network provider should
                            be selected manually; this can be done in two ways:

> **Exclusively selected network**
> The INSYS GPRS 5.0 Ethernet registers at the defined network
> provider. If the network of this provider is not accessible, no
> registration takes place.

> **Preferred selected network – otherwise automatic**
> The INSYS GPRS 5.0 Ethernet first attempts to register at the
> defined network provider. If this fails, the system switches to
> automatic network selection.

If this field is empty (default), in principle an automatic network
selection will take place.

You will find a list with the network provider identification numbers
in the Chapter Network Provider Identification Numbers.

PIN: SIM card PIN. The PIN can consist of 4 to 8 digits. If no PIN is defined, SIM cards with deactivated PINs may be used as well.

▶ **Note**

Before inserting a new SIM card you have to ensure that the correct PIN is stored. The PIN may need to be deleted. Otherwise the INSYS GPRS 5.0 Ethernet tries to login with a wrong PIN, which results in a locked PIN if the attempt is repeated.

APN: APN (Access Point Name) of the GPRS provider. Maximum length 30 characters, e.g. `web.vodafone.de`

GSM logout   0   Function deactivated (default).
Interval: 1 .. 99   Logout interval in hours after device start;
                                        1 minute after the logout   from the GSM network
                                        the INSYS GPRS 5.0 Ethernet will automatically
                                        log in again. The timer is reset.

▶ **Note**

If at the time of the logout a GPRS connection was established, this connection will be interrupted.

▶ **Note**

This function should be activated to enable the GSM/GPRS provider to perform network updates.

Dial-up number: Phone number that marks the PPP remote terminal for the dialup.
                          When dialing in via GPRS, this must be `*99***1#` (default).
                          When dialing in via GSM CSD, the number of the used
                          ISPs must be used. Many ISPs offer individual speed dialing numbers.

PPP user name: PPP user name; maximum length 20 characters.

PPP Password: PPP password, maximum length 20 characters.

Interval for   0   Function deactivated (default).
connection test: 1 .. 255   Time in minutes, for which the connection
                                        to the internet is periodically tested. If the test fails,
                                        the connection is closed. Afterwards, a new
                                        connection setup is started.

▶ **Note**

To test the connection, a DNS query is started. For this test, about 100 byte of billable data traffic will incur.

5.5.4 LAN

The default settings for the INSYS GPRS 5.0 Ethernet are as follows:

> **IP:**   192.168.1.1
> **Subnet mask:**   255.255.255.0

The INSYS GPRS 5.0 Ethernet offers the possibility to control the status of its LAN interface:

> **Always on (default)**
   The LAN interface is permanently active.

> **Controlled via input IN2**
   The LAN interface can be switched on or off via the input IN2.
   If the input IN2 is active (terminal "IN2" connected to "GND"), the LAN interface will be activated as well.
   If the input IN2 is inactive (terminal "IN2" open), the LAN interface will be deactivated.
   In this setting, the according status will be mapped to the output "OUT2".

Better availability through standby router

If necessary, a standby router may be activated through the LAN interface that is switchable via the input IN2. For reasons of availability, it may be required to equip a second router (standby router) with a SIM card of another provider. The standby router should only engage with the LAN, if the standard router looses the connection to the GPRS network.

Interconnection:
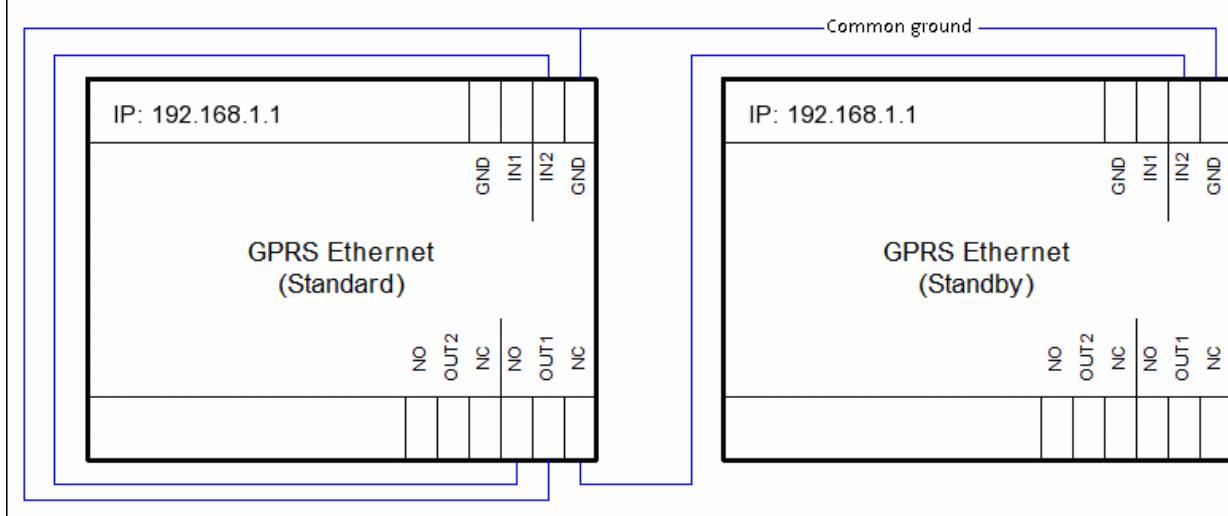
Device configuration:
- Standard and standby router: Configure an identical IP address (example: 192.168.1.1) and sub network mask (example: 255.255.255.0)
- Standard router: Activate LAN connection controlled via IN2
- Standard router: Activate interval for connection test (see Chapter 5.5.3)
- Standby router: Activate an LAN connection controlled via IN2

The connection between OU1-NO and IN2 of the standard router guarantees that the LAN interface of the router is always active when the router is logged into the GPRS network. If the connection should for some reason not be established, OUT1 switches to NC. This will trigger the IN2 of the standby router. The standby router will then activate its LAN interface.
As soon as the standard router has re-established the connection to the GPRS network, OUT1 will switch back to NO. This will deactivate the LAN interface of the standby router and the standard router will again assume the routing function in the network.

> ▶ **Note**
>
> Please note during the configuration that the network interface is inactivated as soon as the function "Activate LAN connection via IN2" is selected, and that no configuration will be possible any more. For this reason, this setting should be the last step during the device configuration.
> The standby configuration assumes that both devices have the same IP addressing. Please make sure during the configuration that only one device at a time is in contact with the LAN. This will prevent IP address conflicts.

5.5.5 NAT

TCP timeout: 1 … 9999   The value of the TCP timeout (default: 130) specifies after how many minutes without data traffic a connection entry in the NAT table will be marked as inactive.

If there are not enough spaces in the NAT table available, all inactive entries are deleted, thus making new spaces available.

As the NAT table allows a maximum of 1024 entries, i.e. it allows 1024 connections that are open simultaneously; a value that is suitable for the requirements of the connected network segment should be selected. We recommend keeping the default value at 130 minutes. Only if very many, but at the same time very short TCP connections from the local network into the Internet are expected should this value be adjusted downwards.

New static NAT entry: With this option, you can create a new static NAT entry, meaning a virtual server.

WAN port: 1 ... 65535   The port on the WAN side of the INSYS GPRS 5.0 Ethernet, which should accept the IP packets from outside.

LAN IP address: The IP address of the destination computer in the local network.

LAN port: 1 ... 65535   The port of the local destination computer, to which the INSYS GPRS 5.0 Ethernet should forward the IP packets from outside.

Protocol: The protocol (TCP/UDP), which the server application of the local destination computer expects. (E.g. TCP for web services or UDP for DNS)

List of the static NAT entries: This list contains the already configured, static NAT entries. They may be removed, if necessary, using the according button.

▶ **Note**

Creating a new NAT entry or removing an existing NAT entry will require a restart of the INSYS GPRS 5.0 Ethernet to take effect.

5.5.6   DynDNS

Use the service offered by "DynDNS" to register a unique domain name, a so-called "Full Qualified Domain Name" in the Internet. The owner of this domain name can assign any IP address to this domain name. The best-known DynDNS provider is DynDNS.org (at: `http://www.dyndns.org`). They offer to register a host name with predefined extensions (e.g. *.dyndns.org, *.mine.nu, etc.) as unique domain name free of cost. Billable services with extended functions are possible as well.

As a so-called DynDNS client, the INSYS GPRS 5.0 Ethernet offers the possibility to allocate the newly assigned WAN IP address to this registered domain name after each GPRS connection setup. A so-called domain name update with the new WAN IP address is performed. After the update was completed successfully, the INSYS GPRS 5.0 Ethernet is again accessible at the specified domain name, even if the WAN IP address has changed, which is usually the case for each GPRS dial-in.

DynDNS Hostname: The domain name designated and registered for this INSYS GPRS 5.0 Ethernet is specified here.
It can have a maximum length of 40 characters.

▶ **Note**

The DynDNS update creates billable data traffic! If you don't require the DynDNS service, leave this field empty. The DynDNS update will then not be started.

DynDNS user name: User name for the DynDNS authentication.
It can have a maximum length of 15 characters.

DynDNS password: Password for the DynDNS authentication.
It can have a maximum length of 15 characters.

DynDNS system: DynDNS service type for which the used hostname is registered. If the free service is used, always select "dyndns" in this field.

DynDNS server: Name of the server which will perform the update.
For the provider "DynDNS.org" this is always:

`"members.dyndns.org"`

As the protocol for the update process is relatively simple; you can also install your own DynDNS service and specify the according DynDNS update server in this field. This is an advantage, if the INSYS GPRS 5.0 Ethernet is part of a virtual private network (VPN).

Please find more information about the DynDSN update protocol in the following PDF file "DynDNS Update Specifications":

http://www.dyndns.com/developers/nicupdate-api.pdf

5.5.7   Administration

On this page, the access protection for the web interface (user name and password) is set. In the default settings, neither a user name nor a password was specified.

In addition, this page offers the opportunity, to restart the INSYS GPRS 5.0 Ethernet or to restore the factory defaults.

> ▶ **Note**
> The password can be reset using the function RESET. (See Chapter Reset to factory defaults.)

5.5.8   Firmware update
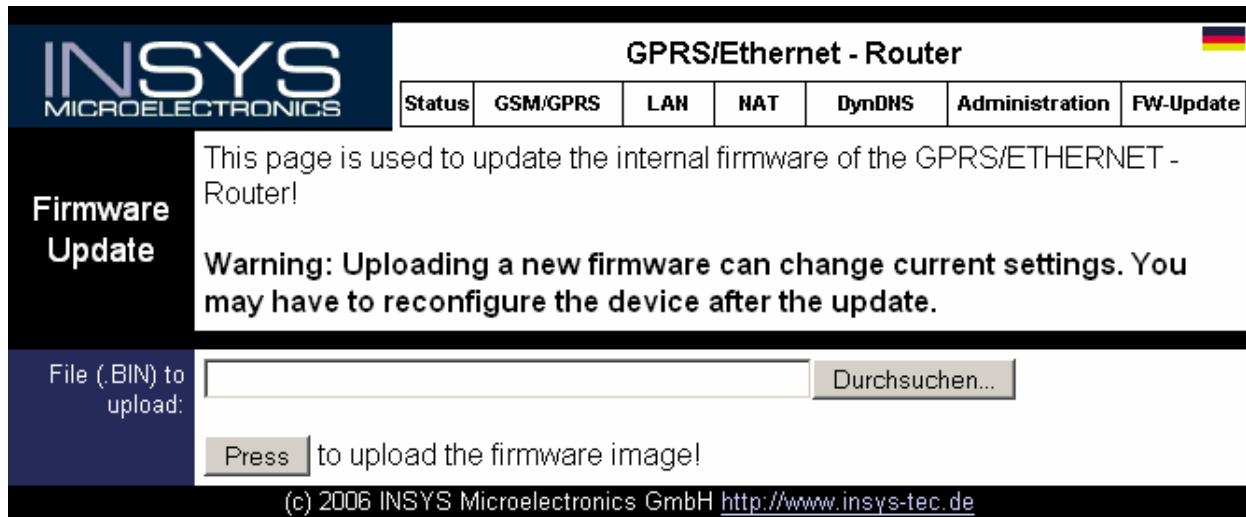
The firmware can be changed in a simple way.

Click on the button "Browse" to select a firmware update file (in general "update.bin") from a local directory. After clicking the button "Start", the selected firmware is transferred to the INSYS GPRS 5.0 Ethernet.

The update takes approximately 30 seconds. Afterwards, a RESET is performed.

> ▶   **Note**
>
> Contingent upon the firmware version, the INSYS GPRS 5.0 Ethernet must be reconfigured after the update.

6   GPRS General

6.1   Application Notes

When using data services via GPRS, providers offer various contract options, especially regarding the pricing (basic price, basic data volume, billing unit). Please contact the according providers for further information.

In general, GPRS providers bill every time a connection is terminated and daily at midnight (the provider will terminate the connection at this time), and all accumulated data are rounded to the billing unit.

We therefore recommend selecting a rate which offers the smallest possible billing unit.

Many GSM/GPRS providers offer so-called M2M rates, which have an exact 1 kb billing matrix.

▶ **Note**

The transmitted amounts of data not only consist of the sum of the application user data. They are rather packed into TCP/IP packets, which also generate network loads and therefore add to the total costs.

6.2   Network Design

The GPRS system is intended as additional service within the scope of the GSM system. The GPRS data exchange (GPRS = General Packet Radio Services) runs packet-oriented, based on the Internet Protocol (IP).

The following figure shows the basic design, where the application has to provide the TCP/IP/PPP stacks. This is required when using the standard GPRS functionality of the GPRS Ethernet.
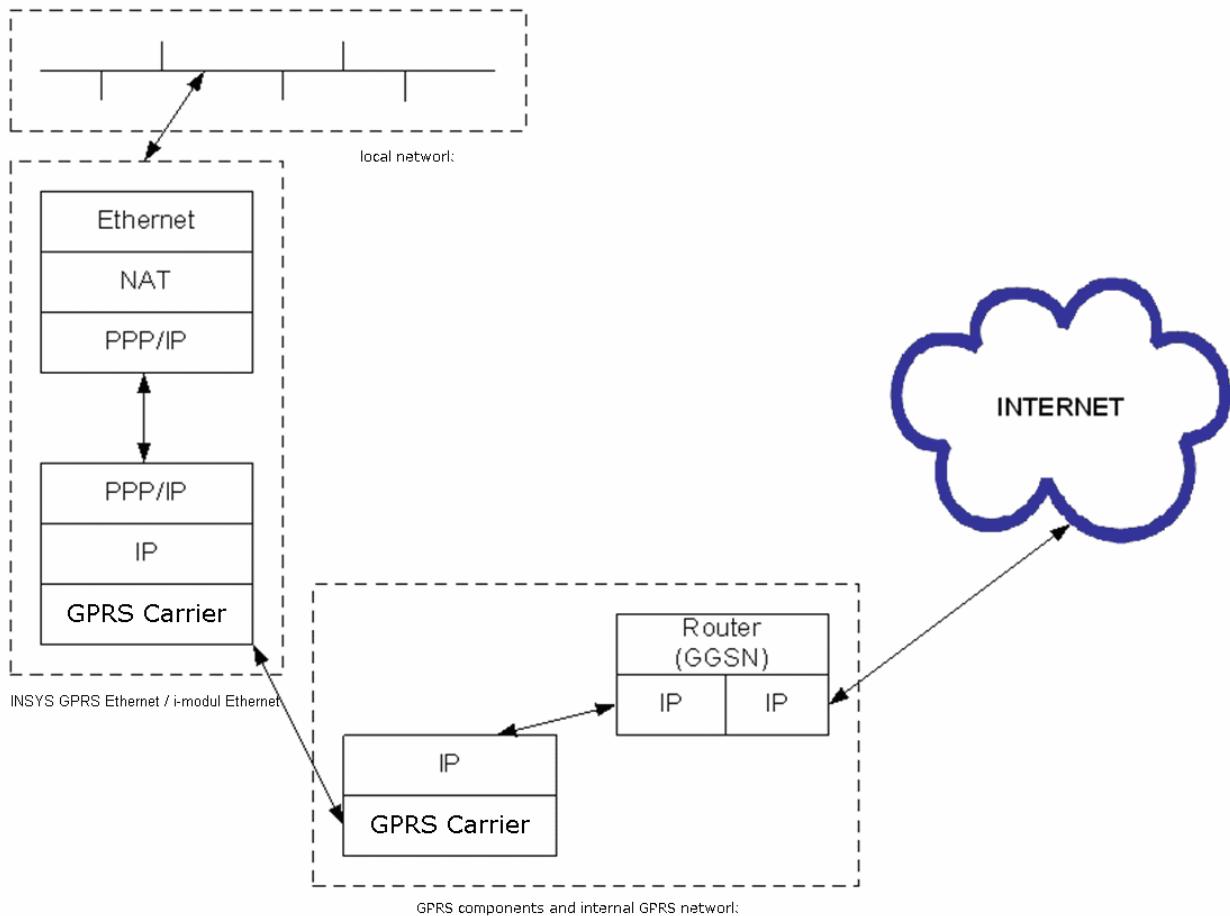
IP Addresses/Accessibility

The IP address of the GPRS end device is dynamically allocated by the provider and is temporary, i.e. during the next dialup at the provider a new IP address is allocated.

In many GPRS networks the IP address can not be accessed from outside (routing-enabled), as the providers perform the addressing for the switch from GPRS networks to the "normal Internet" via a NAT table (Network Address Translation).

This also provides a security aspect, as the GPRS device is not accessible by so-called "scanners" because the IP address can not be accessed. As GPRS is billed by the amount of data, this prevents unwanted and costly data traffic.

This also means that the following functions may not be possible:

➢ Pinging the GPRS device from outside

➢ Establishing TCP/IP connections to the GPRS device from outside

➢ Sending UDP/IP packets to the GPRS device from outside

All connections (channels) must be opened starting with the GPRS device. This means that the GPRS device or the Ethernet device behind it can only react as Client.

Exceptions to this restriction will be provided by the according provider, if available. Please also contact your provider to clarify if it is possible to use a VPN (Virtual Private Network) for possibly required server functionality.

The GPRS provider mdex offers a service called "fixed.IP". This service features a fixed IP address for each SIM card (at the moment only possible for SIM cards from T-mobile and Vodafone) and a secure connection to the device over the internet via a VPN tunnel. For further information contact mdex at http://www.mdex.eu.

6.3   Data Rates

The GPRS Ethernet has the following characteristics:

➢   GPRS Multislot class 12

➢   GPRS End device class B

➢   Support of coding scheme 1 to 4

➢   PBCCH Support

GPRS has several classes (multislot classes) which are relevant for the transmission speed. The classes provide the maximum transmission speed for uplink and downlink.

The table below shows the number of time slots for the classes, which can be used for uplink, downlink, and for the device altogether.

GPRS devices support all variants up to their own multislots.

Multislot class	Downlink slots	Uplink slots	Active slots
8	4 TS	1 TS	5 TS
9	3 TS	2 TS	5 TS
10	4 TS	2 TS	5 TS
11	4 TS	3 TS	5 TS
12	4 TS	4 TS	5 TS

The maximum possible data rate therefore depends on the multislot class of the device. The above table shows the available time slots (TS) of a device; the table below shows the maximum data rate. The data rate, on the other hand, depends on the used coding scheme (CS). This information is unfortunately not available for the user. The network providers use different coding schemes according to the reception situation.

	1 TS	2 TS	3 TS	4 TS
CS1	9.05	18.1	27.15	36.2
CS2	13.4	26.8	40.2	53.6
CS3	15.6	31.2	46.8	62.4
CS4	21.4	42.8	64.2	85.6

Data rates of PC data including GPRS control data

	1 TS	2 TS	3 TS	4 TS
CS1	8	16	24	32
CS2	12	24	36	48
CS3	14.4	28.8	43.2	57,6
CS4	20	40	60	80

Data rates of PC data only (without GPRS control data)

▶ **Note**

The above mentioned values represent the theoretically maximum possible values.

In practice, the following applies:

GPRS will not provide guaranteed data rates or bandwidths for the application. The values allocated by the network provider (coding scheme and time slots to be used) can change dynamically during a connection and, among other things, depend on the current amount of connections in the GSM cell.

6.4 Quality of Service (QoS)

The above mentioned characteristics, data rates (in the form of values such as "data amount per hour" and maximum data amount) and delay times are, among others, a part of the Quality of Services.

Experience has shown that possible changes of the settings will not show any success regarding performance improvement, as the providers always supply "Best Effort" as QoS, i.e. the best values according to the current network load during the moment of the connection setup.

For this reason, we spared the configuration parameters for QoS profiles for the GPRS Ethernet.

Instead of QoS, GPRS will guarantee certain performance, to some degree in individual contracts.

6.5 Delay Times

Usually, there will be marginally higher delays than with a "normal" connection via GSM.

The delays will mostly be below one second.

The average delay times are stated with 700 ms, for GSM values of 500 ms are assumed. Basically, delays of several seconds are possible; the applications at the GPRS end devices should therefore be set to maximum delay times, if possible.

7   GPRS Dial-in Parameters

Overview of network providers for German speaking countries (D, A, CH). All necessary information is available from the customer service center of the provider.

Network Provider	APN	PPP User name	PPP password
mdex	***)	mdex user name	mdex password
T-Mobile (D1) Germany	internet.t-d1.de internet.t-mobile ***)	td1	td1
D2 Vodafone Germany	web.vodafone.de	**)	**)
Eplus Germany	internet.eplus.de	eplus	gprs
O2 Germany	surf.xxl.interkom.de netcompany.interkom.de	*)	*)
T-Mobile Austria	gprsinternet	GPRS	*)
Swisscom Switzerland	gprs.swisscom.ch	gprs	gprs

*)   not required.

**)   any password required

***)   see your mdex contract

Please find a list of APNs of different network providers on the following Internet site:
http://www.insys-tec.de/apn

8   FAQ

Problem:	Possible cause:	Remedy
The GPRS Ethernet does not log in.	The location of the GSM antenna is incorrect.	Check the signal quality of the GSM network. For low field strength – below 12 – the antenna location should be changed.
	PIN incorrect	Enter the correct PIN using the web interface.
	The SIM card is blocked because the PIN was entered incorrectly three times.	A PUK must be entered to enable the card.
	The SIM card is not enabled.	Please contact the contact center of your provider.
	The power supply is not sufficient.	Check the voltage supply using the information from the Chapter Technical Data.
	A wrong or no APN (Access Point Name) was allocated.	Enter the correct APN using the web interface.
	PPP user name and/oder PPP password are missing or were entered incorrectly.	Enter the correct PPP parameters using the web interface.
The GPRS Ethernet blocks incoming IP connections.	The GSM provider does not allow incoming IP connections.	Ask the GSM provider if he allows incoming IP connections. If yes, inquire about the according APN.

9   International Safety Instructions

The following Siemens safety instructions apply to the used GSM/GPRS engine TC63. Following US FCC specifications[5] , each device must have a sticker with a note referring to the "FCC ID" attached.

9.1   Safety Precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any cellular terminal or mobile incorporating TC63. Manufacturers of the cellular terminal are advised to convey the following safety information to users and operating personnel and to incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. Siemens AG assumes no liability for customer's failure to comply with these precautions.

When in a hospital or other health care facility, observe the restrictions on the use of mobiles. Switch the cellular terminal or mobile off, if instructed to do so by the guidelines posted in sensitive areas. Medical equipment may be sensitive to RF energy.

The operation of cardiac pacemakers, other implanted medical equipment and hearing aids can be affected by interference from cellular terminals or mobiles placed close to the device. If in doubt about potential danger, contact the physician or the manufacturer of the device to verify that the equipment is properly shielded. Pacemaker patients are advised to keep their hand-held mobile away from the pacemaker, while it is on.

Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it cannot be switched on inadvertently. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communications systems. Failure to observe these instructions may lead to the suspension or denial of cellular services to the offender, legal action, or both.

Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.

Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. Remember that interference can occur if it is used close to TV sets, radios, computers or inadequately shielded equipment. Follow any special regulations and always switch off the cellular terminal or mobile wherever forbidden, or when you suspect that it may cause interference or danger.

Road safety comes first! Do not use a hand-held cellular terminal or mobile when driving a vehicle, unless it is securely mounted in a holder for speakerphone operation. Before making a call with a hand-held terminal or mobile, park the vehicle.

Speakerphones must be installed by qualified personnel. Faulty installation or operation can constitute a safety hazard.

---

[5] FCC: Federal Communications Commission

IMPORTANT!

Cellular terminals or mobiles operate using radio signals and cellular networks. Because of this, connection cannot be guaranteed at all times under all conditions. Therefore, you should never rely solely upon any wireless device for essential communications, for example emergency calls.

Remember, in order to make or receive calls, the cellular terminal or mobile must be switched on and in a service area with adequate cellular signal strength.

Some networks do not allow for emergency calls if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may need to deactivate those features before you can make an emergency call. Some networks require that a valid SIM card be properly inserted in the cellular terminal or mobile.

9.2   Compliance with FCC Rules and Regulations

The FCC Equipment Authorization Certification for the TC63 reference application is listed under the

FCC identifier QIPTC63

IC: 267W-TC63

granted to Siemens AG.

The TC63 reference application registered under the above identifier is certified to be in accordance with the following Rules and Regulations of the Federal Communications Commission (FCC).

Power listed is ERP for Part 22 and EIRP for Part 24

"This device contains GSM and GPRS Class12 functions in the 900 and 1800MHz Band which are not operational in U.S. Territories.

This device is to be used only for mobile and fixed applications. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. Antennas used for this OEM module must not exceed 8.4dBi gain (GSM 1900) and 2.9dBi (GSM 850) for mobile and fixed operating configurations. This device is approved as a module to be installed in other devices."

Manufacturers of mobile or fixed devices incorporating TC63 modules are advised to include instructions according to above mentioned RF exposure statements in their end product user manual.

Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
If the final product is not approved for use in U.S. territories the application manufacturer shall take care that the 850 MHz and 1900 MHz frequency bands be deactivated and that band settings be inaccessible to end users. If these demands are not met (e.g. if the AT interface is accessible to end users), it is the responsibility of the application manufacturer to always ensure that the application be FCC approved regardless of the country it is marketed in. The frequency bands can be set using the command
`AT^SCFG`="Radio/Band"[,<rbp>][, <rba>].

The FCC label of the module must be visible from the outside. If not, the host device is required to bear a second label stating, "Contains FCC ID QIPTC63".

Summary of the FCC guidelines for 850/1900MHz:

If the final product is not approved in the US territories, the manufacturer should deactivate the frequency bands 850 MHz and 1900 MHz and make sure that they are not accessible to the end user.

If this regulation is not complied with, the manufacturer of the application is responsible for the application being FCC approved – regardless of the country in which it is offered for sale.

10   Network Provider Identification Numbers

Identifiers and names of the network providers (GSM Location Area Identification Number) for the GSM module, in alphabetic order:

41802	2	41902	KT MTCNet	64501	ZM CELTEL
23430	30	41903	KT WATANIYA	64804	ZW ECONET
23431	31	40102	KZ KCELL	64801	ZW NET*ONE
23432	32	40101	KZ K-MOBILE	61801	LBR Lonestar Cell
310150	150	27001	L LUXGSM	29577	LI TANGO
310170	170	27077	L TANGO	61802	LIBERCELL
310410	410	27099	L VOX.LU	60600	LIBYANA
45703	45703	61801	LBR Lonestar Cell	51008	LIPPO TEL
27202	02 - IRL	29577	LI TANGO	65102	LS-ECONET-EZI-CEL
23210	3 AT	61802	LIBERCELL	24602	LT BITE GSM
23806	3 DK	60600	LIBYANA	24701	LV LMT GSM, LV LMT
45403	3 HK	51008	LIPPO TEL	24702	LV TELE2
22299	3 ITA	65102	LS-ECONET-EZI-CEL	45501	MAC-CTMGSM
24002	3 SE	24602	LT BITE GSM	28202	MAGTI-GSM-GEO
23420	3 UK	24701	LV LMT GSM, LV LMT	61001	MALITEL ML
45404	3(2G)	24702	LV TELE2	23458	Manx Pronto
50506	3TELSTRA	45501	MAC-CTMGSM	90112	MCP Maritime Com
62801	628 01/LIBERTIS	28202	MAGTI-GSM-GEO	25902	MD MOLDCELL
23207	A tele.ring	61001	MALITEL ML	25901	MD VOXTEL
23201	A1	23458	Manx Pronto	25002	MegaFon RUS
46668	ACeS	90112	MCP Maritime Com	70801	Megatel GSM
51000	ACeS	25902	MD MOLDCELL	64602	MG ANTARIS
51511	ACeS	25901	MD VOXTEL	64601	MG Madacom
52020	ACeS	25002	MegaFon RUS	61902	MILLICOM SL
41201	AF AWCC	70801	Megatel GSM	29402	MKD COSMOFON
40402	AirTel	64602	MG ANTARIS	29401	MKD-MOBIMAK
40403	AirTel	64601	MG Madacom	41401	MM 900
40410	AirTel	61902	MILLICOM SL	42899	MN MobiCom
40431	AirTel	29402	MKD COSMOFON	21805	MOBI'S
40445	AirTel	29401	MKD-MOBIMAK	29341	MOBITEL
40449	AirTel	41401	MM 900	41301	Mobitel
40490	AirTel	42899	MN MobiCom	45601	MOBITEL - KHM
40492	AirTel	21805	MOBI'S	64002	MOBITEL - TZ
40493	AirTel	29341	MOBITEL	63401	MobiTel SDN
40494	AirTel	41301	Mobitel	22004	MONET
40495	AirTel	45601	MOBITEL - KHM	60401	MOR IAM
40496	AirTel	64002	MOBITEL - TZ	60400	MOR MEDITEL
40497	AirTel	63401	MobiTel SDN	21407	movistar
40498	AirTel	22004	MONET	70403	MoviStar
41501	alfa	60401	MOR IAM	70604	MoviStar
60301	ALG Mobilis	60400	MOR MEDITEL	64301	MOZ - mCel
42001	ALJAWAL	21407	movistar	60901	MR MATTEL
79502	Altyn Asyr	70403	MoviStar	64901	MTC NAMIBIA
72424	AMAZONIA	70604	MoviStar	42602	MTC VODAFONE BH

27601	AMC - AL	64301	MOZ - mCel	28401	M-TEL GSM BG
34008	AMIGO	60901	MR MATTEL	62130	MTN - NG
362951	ANT	64901	MTC NAMIBIA	62401	MTN CAM
36269	ANT CURACAO TELECOM GSM	42602	MTC VODAFONE BH	65510	MTN-SA
34430	APUA PCS ANTIGUA	28401	M-TEL GSM BG	64110	MTN-UGANDA
72234	AR PERSONAL	62130	MTN - NG	25702	MTS BY
28010	areeba	62401	MTN CAM	25001	MTS-RUS
41702	areeba	65510	MTN-SA	47201	MV DHIMOBILE
63402	areeba SDN	64110	MTN-UGANDA	65001	MW CP 900
722310	ARG CTI Movil	25702	MTS BY	33403	MX MOVISTAR GSM
41800	ASIACELL	25001	MTS-RUS	33420	Mx Telcel GSM
41805	ASIACELL	47201	MV DHIMOBILE	50219	MY CELCOM
41820	Atheer Iraq	65001	MW CP 900	50213	MY CELCOM 3G
28603	AVEA	33403	MX MOVISTAR GSM	50212	MY MAXIS
40001	AZE - AZERCELL GSM	33420	Mx Telcel GSM	24202	N NetCom GSM
20610	B mobistar	50219	MY CELCOM	24201	N Telenor
43604	Babilon-M	50213	MY CELCOM 3G	42203	NAWRAS
21803	BA-ERONET	50212	MY MAXIS	54601	NCL MOBILIS
40002	BAKCELL GSM 2000	24202	N NetCom GSM	61403	NE TELECEL
47003	Banglalink	24201	N Telenor	62140	NG Mtel
20620	BASE	42203	NAWRAS	20408	NL KPN
36439	BaTelCell	54601	NCL MOBILIS	20412	NL Telfort
42601	BATELCO	61403	NE TELECEL	26207	o2 - de
25028	Bee Line	62140	NG Mtel	26208	o2 - de
25099	Bee Line	20408	NL KPN	23410	O2 - UK
20601	BEL PROXIMUS	20412	NL Telfort	27402	Og Vodafone
61604	BELL BENIN COMMUNICATION	26207	o2 - de	27403	Og Vodafone
61302	BF Celtel	26208	o2 - de	72431	Oi
28405	BG GLOBUL	23410	O2 - UK	732111	OLA
47002	BGD AKTEL	27402	Og Vodafone	42202	OMAN MOBILE
47004	BGD bMobile	27403	Og Vodafone	24601	OMNITEL LT
47001	BGD-GP	72431	Oi	23205	one
21890	BH GSMBIH	732111	OLA	23433	Orange
43701	BITEL KGZ	42202	OMAN MOBILE	23830	Orange
61603	BJ BENINCELL	24601	OMNITEL LT	37001	orange
73602	BOMOV	23205	one	40420	Orange
34020	BOUYGTEL-C	23433	Orange	65202	Orange
40421	BPL MOBILE	23830	Orange	62402	Orange CAM
40427	BPL MOBILE	37001	orange	22803	orange CH
40443	BPL MOBILE	40420	Orange	61203	Orange CI
40446	BPL MOBILE	65202	Orange	20801	Orange F
72416	BRA BrTCelular	62402	Orange CAM	29502	Orange FL
72415	BRA SCTL	22803	orange CH	20420	Orange NL
52811	BRU-DSTCom	61203	Orange CI	64700	Orange re
40211	BT B-Mobile	20801	Orange F	23101	Orange SK
35002	BTC MOBILITY LTD.	29502	Orange FL	52099	Orange Th
70267	BTL	20420	Orange NL	25011	ORENSOT
64202	BUSAFA	64700	Orange re	23003	OSKAR

65201	BW MASCOM	23101	Orange SK	26803	P OPTIMUS
25701	BY VELCOM	52099	Orange Th	26806	P TMN
338180	C&W	25011	ORENSOT	41004	PAK - PL
342600	C&W	23003	OSKAR	71401	PANCW
344920	C&W	26803	P OPTIMUS	70401	PCS
346140	C&W	26806	P TMN	311170	PetroCom
352110	C&W	41004	PAK - PL	51505	PH Sun Cellular
354860	C&W	71401	PANCW	31180	Pine Cellular
356110	C&W	70401	PCS	41001	PK MK
358110	C&W	311170	PetroCom	41003	PK-UFONE
360110	C&W	51505	PH Sun Cellular	26001	Plus GSM
365840	C&W	31180	Pine Cellular	53701	PNGBMobile
366110	C&W	41001	PK MK	74001	PORTA GSM
376350	C&W	41003	PK-UFONE	25092	Primetelefone RUS
23455	Cable & Wireless Guernsey	26001	Plus GSM	22002	ProMonte
45618	CAMBODIA SHINAWATRA	53701	PNGBMobile	74402	PRY Porthable
302720	CAN Rogers Wireless Inc.	74001	PORTA GSM	310500	PSC Wireless
348570	CCT Boatphone	25092	Primetelefone RUS	74405	PY Personal
63089	CD OASIS	22002	ProMonte	42701	QAT QATARNET
61803	Celcom GSM	74402	PRY Porthable	28301	RA-ARMGSM
65507	Cell C	310500	PSC Wireless	63510	R-CELL
311130	Cell One Amarillo	74405	PY Personal	25012	RF FAR EAST
310450	Cell One of NE Colorado	42701	QAT QATARNET	41503	RL MTC Lebanon
40434	CellOne	28301	RA-ARMGSM	22601	RO CONNEX
40438	CellOne	63510	R-CELL	22603	RO Cosmorom
40451	CellOne	25012	RF FAR EAST	22610	RO ORANGE
40453	CellOne	41503	RL MTC Lebanon	41220	ROSHAN
40454	CellOne	22601	RO CONNEX	25007	RUS 07, RUS SMARTS
40455	CellOne	22603	RO Cosmorom	25017	RUS 17
40457	CellOne	22610	RO ORANGE	25010	RUS DTC
40458	CellOne	41220	ROSHAN	25013	RUS Kuban-GSM
40459	CellOne	25007	RUS 07, RUS SMARTS	25044	RUS North Caucasian GSM
40462	CellOne	25017	RUS 17	25019	RUS_BASHCELL
40464	CellOne	25010	RUS DTC	25015	RUS15, RUS SMARTS
40466	CellOne	25013	RUS Kuban-GSM	25016	RUS16,250 16
40471	CellOne	25044	RUS North Caucasian GSM	24007	S COMVIQ
40472	CellOne	25019	RUS_BASHCELL	42101	SabaFon
40473	CellOne	25015	RUS15, RUS SMARTS	63902	Safaricom
40474	CellOne	25016	RUS16,250 16	61401	SAHELCOM
40475	CellOne	24007	S COMVIQ	41808	SanaTel
40476	CellOne	42101	SabaFon	25005	SCS RUS
40477	CellOne	63902	Safaricom	71073	SERCOM
40479	CellOne	61401	SAHELCOM	36301	SETAR GSM
40480	CellOne	41808	SanaTel	63301	SEYCEL
40481	CellOne	25005	SCS RUS	63310	SEZ AIRTEL
61701	CELLPLUS-MRU	71073	SERCOM	64710	SFR REUNION
310560	Cellular One DCS	36301	SETAR GSM	52503	SGP-M1-3GSM
61402	CELTEL	63301	SEYCEL	29370	SI VEGA 070
62901	CELTEL	63310	SEZ AIRTEL	29340	SI vodafone

63903	CELTEL	64710	SFR REUNION	25004	SIBCHALLENGE RUS
64005	celtel	52503	SGP-M1-3GSM	52501	SingTel
63002	CELTEL DRC	29370	SI VEGA 070	52502	SingTel-G18
62803	CELTEL GA	29340	SI vodafone	51503	SMART
65010	CELTEL MW	25004	SIBCHALLENGE RUS	45406	SmarTone
61901	CELTEL SL	52501	SingTel	45500	SmarTone
62201	CELTEL TCD	52502	SingTel-G18	45415	SmarTone 3G
70802	CELTELHND	51503	SMART	60801	SN ALIZE
				60802	SN-SENTEL SG
31030	Centennial Communications	45406	SmarTone		
46000	CHINA MOBILE	45500	SmarTone	63704	SOMAFONE
46001	CHN-CUGSM	45415	SmarTone 3G	43601	Somoncom
46692	Chunghwa	60801	SN ALIZE	63701	SOMTELESOM
310380	Cingular	60802	SN-SENTEL SG	42102	SPACETEL
342810	Cingular	63704	SOMAFONE	64201	Spacetel Bl
344930	Cingular	43601	Somoncom	30801	SPM AMERIS
35010	Cingular	63701	SOMTELESOM	24010	SpringMobil SE
35230	Cingular	42102	SPACETEL	74602	SR.TELESUR.GSM
35830	Cingular	64201	Spacetel Bl	41303	SRI - CELLTEL
36010	Cingular	30801	SPM AMERIS	41302	SRI DIALOG
36620	Cingular	24010	SpringMobil SE	21303	STA-MOBILAND
54801	CK KOKANET	74602	SR.TELESUR.GSM	52505	STARHUB
73001	CL ENTEL PCS	41303	SRI - CELLTEL	62601	STP CSTmovel
73010	CL ENTEL PCS	41302	SRI DIALOG	45419	SUNDAY
72405	Claro	21303	STA-MOBILAND	22802	sunrise
62910	COG LIBERTIS	52505	STARHUB	65310	Swazi-MTN
				24004	SWEDEN
732101	COLOMBIA - COMCEL S.A	62601	STP CSTmovel		
70402	Comcel_GSM	45419	SUNDAY	24005	Sweden 3G
62501	CPV MOVEL	22802	sunrise	22801	Swisscom
72432	CTBC CEL	65310	Swazi-MTN	29501	SwisscomFL
72433	CTBC CEL	24004	SWEDEN	41709	SYR MOBILE SYR
72434	CTBC CEL	24005	Sweden 3G	41701	SYRIATEL
36801	CU/C_COM	22801	Swisscom	46689	T3G
28001	CY CYTAGSM	29501	SwisscomFL	45708	TANGO LAO
25014	Di-ex	41709	SYR MOBILE SYR	23801	TDC MOBIL
50216	DiGi	41701	SYRIATEL	36251	Telcell GSM
33805	DIGICEL	46689	T3G	29001	TELE Greenland
342750	DIGICEL	45708	TANGO LAO	24603	TELE2
35250	Digicel	23801	TDC MOBIL	24803	TELE2
35850	DIGICEL	36251	Telcell GSM	25020	TELE2
36070	DIGICEL	29001	TELE Greenland	61602	TELECEL BENIN
70602	Digicel	24603	TELE2	74404	Telecel GSM
310940	Digital Cellular	24803	TELE2	64502	TELECEL ZM
73402	DIGITEL TIM	25020	TELE2	64803	TELECEL ZW
63801	DJ EVATIS	61602	TELECEL BENIN	64282	TELECEL-BDI
60302	Djezzy	74404	Telecel GSM	61205	TELECEL-CI
23802	DK SONOFON	64502	TELECEL ZM	73002	TELEFONICA
60303	DZA-NEDJMA	64803	TELECEL ZW	310740	TELEMETRIX
21403	E AMENA	64282	TELECEL-BDI	72423	TELEMIG CEL
31090	Edge Wireless	61205	TELECEL-CI	70603	TELEMOVIL
24802	EE elisa	73002	TELEFONICA	41006	Telenor PK
24801	EE EMT GSM	310740	TELEMETRIX	23820	TELIA DK

60201	EGY MobiNiL	72423	TELEMIG CEL	24001	TELIA S
61710	EMTEL-MRU	70603	TELEMOVIL	50501	Telstra Mobile
311160	EMW	41006	Telenor PK	310900	Texas Cellular
26203	E-Plus	23820	TELIA DK	61501	TG-TOGO CELL
26002	Era	24001	TELIA S	52015	TH ACT 1900
70601	ESV PERSONAL	50501	Telstra Mobile	52001	TH GSM
63601	ETH-MTN	310900	Texas Cellular	52023	TH GSM 1800
42003	Etihad Etisalat	61501	TG-TOGO CELL	52018	TH-DTAC
45702	ETL MOBILE NETWORK	52015	TH ACT 1900	71610	TIM
23002	EUROTEL - CZ	52001	TH GSM	72402	TIM BRASIL
20820	F - BOUYGUES TELECOM	52023	TH GSM 1800	72403	TIM BRASIL
20810	F SFR	52018	TH-DTAC	72404	TIM BRASIL
46601	Far EasTone	71610	TIM	20210	TIM GR
311210	FARMERS	72402	TIM BRASIL	43603	TJK MLT
41601	Fastlink	72403	TIM BRASIL	51402	TLS-TT
24414	FI AMT	72404	TIM BRASIL	31026	T-Mobile
24491	FI SONERA	20210	TIM GR	31031	T-Mobile
302370	Fido	43603	TJK MLT	310160	T-Mobile
24403	FINNET	51402	TLS-TT	310200	T-Mobile
24412	FINNET	31026	T-Mobile	310210	T-Mobile
54201	FJ VODAFONE	31031	T-Mobile	310220	T-Mobile
24405	FL elisa	310160	T-Mobile	310230	T-Mobile
29505	FL1	310200	T-Mobile	310240	T-Mobile
34001	F-Orange	310210	T-Mobile	310250	T-Mobile
34002	FR	310220	T-Mobile	310260	T-Mobile
55001	FSM Telecom	310230	T-Mobile	310270	T-Mobile
54720	F-VINI	310240	T-Mobile	310660	T-Mobile
28801	F□oya Tele	310250	T-Mobile	23203	T-Mobile A
62802	GAB TELECEL	310260	T-Mobile	23001	T-Mobile CZ
60701	GAMCEL	310270	T-Mobile	26201	T-Mobile D
28201	GEO-GEOCELL	310660	T-Mobile	21630	T-Mobile H
62002	GH ONEtouch	23203	T-Mobile A	21901	T-Mobile HR
62001	GH SPACEFON	23001	T-Mobile CZ	20416	T-Mobile NL
62003	GH-MOBITEL	26201	T-Mobile D	23102	T-Mobile SK
26601	GIBTEL GSM	21630	T-Mobile H	28602	TR TELSIM
62150	Glo NG	21901	T-Mobile HR	28601	TR TURKCELL
51502	Globe Telecom-PH	20416	T-Mobile NL	37412	TSTT
61102	GN LAGUI	23102	T-Mobile SK	60503	TUNISIANA
62701	GNQ01	28602	TR TELSIM	60502	TUNISIE TELECOM
27821	go mobile	28601	TR TURKCELL	46697	TWN GSM 1800
20201	GR COSMOTE	37412	TSTT	46693	TWN MOBITAI
20209	GR Q-TELECOM	60503	TUNISIANA	25506	UA life:)
73802	GUY CLNK PLS	60502	TUNISIE TELECOM	25501	UA UMC
73801	GUY TW	46697	TWN GSM 1800	42402	UAE ETISALAT
21601	H PANNON GSM	46693	TWN MOBITAI	25505	UA-GT
311110	High Plains	25506	UA life:)	25503	UA-KYIVSTAR
31070	Highland	25501	UA UMC	53901	U-CALL
45400	HK CSL	42402	UAE ETISALAT	64101	UG CelTel
45402	HK CSL	25505	UA-GT	25502	UKR-WellCOM
45418	HK CSL	25503	UA-KYIVSTAR	41603	UMNIAH
45410	HK NEW WORLD	53901	U-CALL	72207	UNIFON

45412	HK PEOPLES	64101	UG CelTel	63102	UNITEL
45416	HK SUNDAY	25502	UKR-WellCOM	25039	Uraltel
70830	HND	41603	UMNIAH	74810	URYAMWU
74401	HOLA PARAGUAY S.A.	72207	UNIFON	310870	US
21910	HR VIP	63102	UNITEL	31020	US - Union Telephone
65401	HURI	25039	Uraltel	310100	US PLATEAU
40401	Hutch	74810	URYAMWU	310320	USA - CellularOne
40405	Hutch	310870	US	310590	USA - Extended Area
40411	Hutch	31020	US - Union Telephone	310690	USA - Immix Wireless
40413	Hutch	310100	US PLATEAU	31080	USA 080
40415	Hutch	310320	USA - CellularOne	310340	USA 340
40430	Hutch	310590	USA - Extended Area	310640	USA AE Airadigm
40484	Hutch	310690	USA - Immix Wireless	310630	USA AmeriLink
40486	Hutch	31080	USA 080	310190	USA Dutch Harbor
40488	Hutch	310340	USA 340	310400	USA i CAN
40566	Hutch	310640	USA AE Airadigm	311250	USA i CAN
41308	Hutch	310630	USA AmeriLink	31100	USA Mid-Tex Cellular, Ltd
45503	Hutchison MAC	310190	USA Dutch Harbor	310790	USA Pinpoint
22201	I TIM	310400	USA i CAN	31046	USA SIMMETRY
22288	I WIND	311250	USA i CAN	310950	USA XIT
71201	I.C.E.	31100	USA Mid-Tex Cellular, Ltd	310950	Cellular
40404	IDEA	310790	USA Pinpoint	310880	USAACSI
40407	IDEA	31046	USA SIMMETRY	311190	USAC1ECI
40412	IDEA	310950	USA XIT	31170	USAEC
40419	IDEA	310950	Cellular	310910	USAFC
40422	IDEA	310880	USAACSI	31190	USASXLP
40424	IDEA	311190	USAC1ECI	31040	USATX
40456	IDEA	31170	USAEC	310530	USA-WVA WIRELESS
40478	IDEA	310910	USAFC	64111	UTL-Mango
26003	IDEA, PL IDEA, PL 03	31190	USASXLP	43405	UZB CSOCOM GSM
61002	IKATEL ML	31040	USATX	43404	UZB DAEWOO-GSM
42502	IL Cellcom	310530	USA-WVA WIRELESS	43407	UZB-UZD
42501	IL ORANGE	64111	UTL-Mango	27404	Viking
42503	IL Pelephone	43405	UZB CSOCOM GSM	73601	VIVA
22807	In&Phone	43404	UZB DAEWOO-GSM	45201	VN MOBIFONE
40442	INA AIRCEL	43407	UZB-UZD	45202	VN VINAPHONE
40441	INA RPG	27404	Viking	45204	VNM and VIETTEL
40414	INA SPICE	73601	VIVA	64004	VodaCom
40444	INA SPICE	45201	VN MOBIFONE	63001	VODACOM CD
51011	IND - Excelcom	45202	VN VINAPHONE	65101	Vodacom Lesotho
40440	IND AIRTEL	45204	VNM and VIETTEL	64304	VodaCom-MZ
40551	IND AirTel	64004	VodaCom	65501	VodaCom-SA
40552	IND AirTel	63001	VODACOM CD	27602	vodafone AL
40553	IND AirTel	65101	Vodacom Lesotho	50503	vodafone AU
40554	IND AirTel	64304	VodaCom-MZ	60202	vodafone EG
40555	IND AirTel	65501	VodaCom-SA	21401	vodafone ES
51001	IND INDOSAT	27602	vodafone AL	20205	vodafone GR
51021	IND INDOSAT	50503	vodafone AU	21670	vodafone HU
51010	IND TELKOMSEL	60202	vodafone EG	27201	vodafone IE
40470	INDH1	21401	vodafone ES	22210	vodafone IT
31130	Indigo	20205	vodafone GR	44020	Vodafone JP

43602	Indigo-T	21670	vodafone HU	27801	vodafone MT
310770	Iowa Wireless USA	27201	vodafone IE	20404	vodafone NL
43214	IR KISH	22210	vodafone IT	53001	vodafone NZ
43219	IR MTCE	44020	Vodafone JP	26801	vodafone P
43232	IR, VALIACOM	27801	vodafone MT	24008	vodafone SE
41830	IRAQNA	20404	vodafone NL	23415	vodafone UK
27203	IRL - METEOR	53001	vodafone NZ	26202	Vodafone.de
43211	IR-TCI	26801	vodafone P	54101	VUT SMILE
27401	IS SIMINN	24008	vodafone SE	73401	VZ INFO
51501	ISLACOM	23415	vodafone UK	41007	WaridTel
				23450	wave
42505	JAWWAL-PALESTINE	26202	Vodafone.de		
41677	JO MobCom	54101	VUT SMILE	31101	Wilkes USA
44010	JP DoCoMo	73401	VZ INFO	31105	Wilkes USA
28802	KALL	41007	WaridTel	50502	YES OPTUS
46688	KGT-Online	23450	wave	22001	YU MOBTEL
45602	KHM-Hello GSM	31101	Wilkes USA	22003	YUG 03
54509	KL-Frigate	31105	Wilkes USA	64003	ZANTEL-TZ
45005	KOR SK Telecom	50502	YES OPTUS	64501	ZM CELTEL
46703	KP SUN	22001	YU MOBTEL	64804	ZW ECONET
45002	KR KTF	22003	YUG 03	64801	ZW NET*ONE
45008	KR KTF	64003	ZANTEL-TZ		